

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXX: No 8.

New York, Thursday, August 24, 1882.

\$2.50 a Year, Including Postage.
Single Copies, Ten Cents.

Large Drawing and Stamping Press.

Mr. E. W. Bliss, of Brooklyn, N. Y., has just completed a new stamping and drawing press which, in design, size and style of work to be done, is unique. It is built on a plan rarely seen at the present day in large presses, the driving shaft being at the bottom and the work above, with all the strains taken directly upon connecting-rods at the sides. The press is an original design made for the Enamelled Metal Stamping Company, of Zug, Switzerland, a town not far from Zurich. The press itself weighs 65,000 pounds and stands 18 feet high. The largest work it is intended to make is a dish or pail 26 inches in diameter and 16 inches deep, from a disk or blank no less than 49 inches in diameter. This, we believe, is the largest piece of sheet metal stamping that has ever been attempted either in this or any other country. The engraving gives a very good idea of the general appearance of the press and its connections. In its working parts it consists essentially of a main shaft carried in brackets, supporting a bed-plate on which are two standards carrying the guides for the punches, and between which blank holders, &c., are placed. A pair of connecting-rods on each side, coupled to cranks below and to a cross-head above, transfer the motion of the cranks to the dies. The size of the press is so great that the weight of the parts alone is sufficient to do some of the work usually performed by separate cranks. For example, the blank holders fall by gravity, and, after seating, are held in place by stops, shown in the figure like bent levers, pivoted on each side of the main cross-head. These are actuated by two short slotted arms shown standing at an angle in front of the cross-head. Through the center of these the blank holder, die holder or plunger works, being forced down by the connecting rods after the blank holders have reached their proper place. These holders are so heavy that although cored out to some extent, they are counterbalanced by a cast-iron box weighing some 3000 pounds. This box is sustained on the ends of two beams at the top of the machine, which are connected at their front ends with a set of equalizing bars. The blank holders are lifted by wrought-iron cross-heads which, in the up stroke, rest upon the top of the main cross-head. The amount of power required and the strains which the press must withstand in doing this work, can best be guessed from the fact that there are two 62 inch fly-wheels on the shaft, each weighing 1900 pounds. The driving pulley is 36 inches in diameter and 12-inch face, and the press is geared 60 to 1. The shafts, which have three bearings each, are respectively 4, 5, 6 and 7 inches in diameter. They are parallel pieces of steel without shoulders or collars, and have bronze boxes. The main shaft, which is 7 inches in diameter, is relieved from all torsional strains by double gear wheels upon each end, the crank-pins being in the gear wheels. These pins are 5½ inches in diameter by 6 inches long, and like the shafts, are parallel pieces of steel. They are the same size in the crank-eyes as in the journals, and are forced in by hydraulic pressure. The hubs of the wheels form the collars and hold the shafts in place. To do this the gear wheels, especially the larger ones, are put on in a peculiar manner. Two feathers, 1¼ inches square, are let into the shaft, over which the wheels are slipped and held fast by two keys driven on the top of these feathers. These keys are only 1¼ by ¾, with a draft of about 1-16th inch in 10 inches. The distance between the uprights on the working table is 50 inches, which is practically the largest diameter of blank. The die opening in the blank holder ring is 39 inches, which is the largest punch that can be used. The stroke of the top die is 36 inches and of the blank holder 16½. The friction-clutch used for this press is actuated by a wedge, but the wedge is adjustable in such a way that only a given and fixed amount of pressure can be obtained from it. When more is wanted an adjusting screw and gib can be used to obtain it. The connecting-rods are of a type which deserve to be better known, consisting of two rods with shoulders at suitable distances apart, upon which the boxes are held by nuts. The shoulders insure the parts going together at the proper length, while the division of the rods into two parts makes the quality of the metal much more certain, and enables a lighter rod to be made than would be possible with a single forging. This press is intended to make a variety of goods from black iron which are afterward enameled, and it shows the growing tendency to abandon piecework and make more and more of our heavy sheet metal ware in pieces. The great height of the press makes it necessary to place it upon two floors, the workmen being elevated nearly 6 feet above the foundation level. Although Mr. Bliss has built some very massive presses, and some of which, at the time they were designed, were the largest ever constructed, yet even the heaviest of these seems to be dwarfed when placed alongside of this one.

According to the *Moniteur des Interets Matériels*, the Sarre coal district is already beginning to profit by the opening of the St. Gothard Tunnel. Up to the present time the consignments consisted chiefly of trial orders, and several months will probably elapse before it will be possible to judge the probable importance of the Italian market in the future. During the month of June about 4000 tons of coal passed through the tunnel.

Water-Tight Bulkheads.

One of the daily papers recently had the following article in regard to water-tight bulkheads in steamers:

The safety inherent in the water-tight bulkhead system, as such is now practiced in the building of seagoing steam vessels, has been lately a fruitful theme of discussion in England. The safety afforded has been attacked by the lay press vigorously indeed, while the journals devoted to engineering, shipbuilding and other kindred mechanical subjects, have rallied to the support of the present system of surveying, inspection and classification, claiming that as now practiced it is the best that can be had under the present conditions of knowledge in such matters. A correspondent of *Engineering*, London, however, strikes a severe blow at the present practice when he writes in the issue of July 7, from Rangoon, as follows: "I made a point of observing these water-tight doors in shaft tunnels of screw steamers. I find that 8 per cent. might be shut in less than 10 min-

nel door, or the opening from the engine room to the shaft tunnel, is an opening of vital importance, and yet, strange to say, in some cases it is neglected shamefully by careless or incompetent engineers.

"The passage is used a great deal, and, you know, 'familiarity breeds contempt.' Too much care, however, cannot be paid to these doors, which, in case of accident, must be closed instantaneously from the deck above, and it is possible, also, that, though found efficient in its working to-day, a door might fail to close tightly to-morrow. Many practical reasons can be given for this. The after hold is very large in the modern steamship, and so is the engine and boiler space, and if, by reason of the bulkhead between them not being water-tight, both are flooded, destruction is certain. This is one reason why ruptures of the after portion of the ship always prove so fatal in collisions at sea. The greater number of collisions which occur in ocean navigation fortunately happen when the vessels are 'end on' or nearly so, and ruptures of the forward compartments are

ing is too often the case, and, in my opinion, criminal to the last degree."

In the office of the United States Inspector of Steam Vessels, no one seemed to know of any such rule, nor was any one impressed with its importance. In fact, they seemed to know very little about water-tight bulkheads and their doors, or anything else connected with the matter.

Iron Founding in Bavaria.

The *Ironmonger* correspondent at Nuremberg, Germany, in a recent note on the exhibition at that place, gives the following official statistics concerning mining and iron founding in Bavaria:

The earliest records mention that iron ovens were cast in Alsace in 1490. Cast-iron cannon were manufactured in Prussia in 1667. The first iron bridge was erected in England in 1773, in Germany in 1794. Statue-casting in iron was first practiced about the year 1780, at the Lauchhammer Iron-

bach, and the Sassenreuther mine, which however are worked only at intervals. The principal ore of Amberg is brown ironstone, containing about 55.5 per cent. of metallic iron, 3 per cent. of manganese, .8 phosphorus, 10.3 water, and 14.4 per cent. of clay and quartz. Spatheose ironstone of inferior quality is found at greater depths, especially near Auerbach, analyses having given the following results:

	Per cent.
Metallic Iron	38.54
Protoxide of Manganese	1.42
Phosphorus	2.09
Carbonic Acid	30.80

The remainder consists of lime, dolomite, clay, quartz and water. The ore beds, which are from about 260 to 290 feet wide, are at present worked at a depth of 115 feet below the deepest adit level. At the private mines on the Lobenhof, the northern extension of the Amberg vein, which at that point is about 140 feet wide, 15,000 tons of ore are raised by 30 men, while still further north the private Etzmannsberg mine employs 76 men and yields 33,000 tons. The once flourishing iron industry of Bavaria, especially in the Oberpfalz, in the Pfalz, and in certain parts of Lower Franconia, has disappeared in consequence of the high price of charcoal, the difficulty of obtaining coke, and the severe competition of ironworks in other districts. The following figures, showing the blast furnaces at work 20 years ago and now, speak for themselves:

	1862	1868	1878	1880
Charcoal blast furnaces	77	20	5	5
Coke furnaces	2	1	2	2

Even these few furnaces are not constantly employed, so that the total production of pig is small. The following figures are for 1880: In Oberbayern (Higher Bavaria), total production of pig iron, 1572 tons; in the Oberpfalz, 24,594; in the Pfalz, 3126. Of iron castings 60 works turned out 27,770 tons; of rod and bar iron 26 works produced 66,787 tons; of black sheets five establishments made 2270 tons; one iron wire works produced 2637 tons; and one concern employed on steel wire turned out 760 tons. The number of men employed at all the ironworks amounts to 4780, and the output is valued at 18,908,147 marks, or about \$4,440,000.

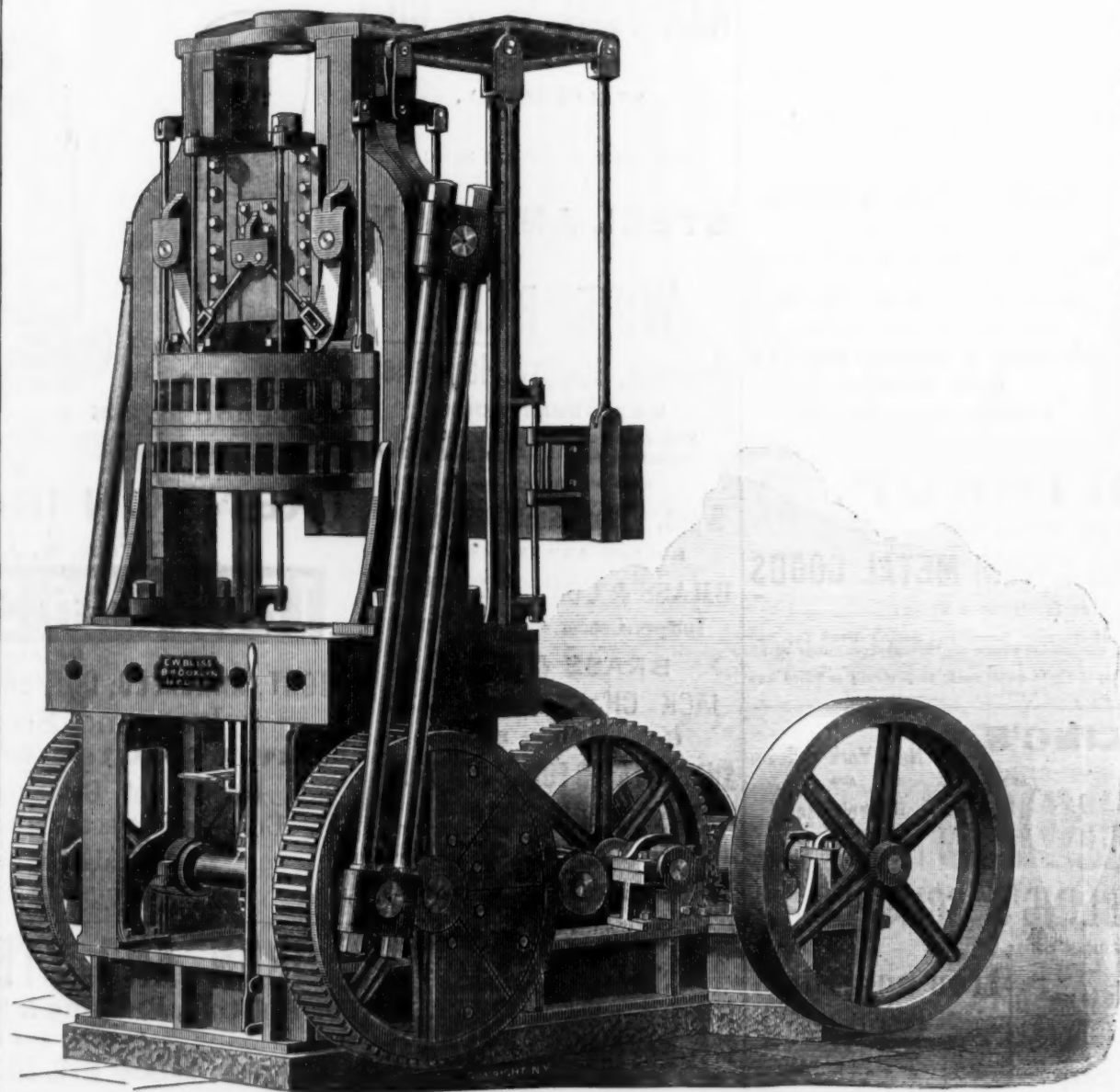
Speaking of the exhibition, the correspondent states that of the different specimens of iron ores shown, those from the Leonie mines are made up as follows:

74.160	Oxide of iron = 51.92 metallic iron.
0.262	Oxide of manganese = 0.182 manganese.
4.540	Phosphoric acid = 1.985 phosphorus.
1.599	Lime.
0.470	Magnesia.
5.541	Silicic acid.
0.283	Sulphuric acid.
11.865	Lost in working.

Another sample shows 74.21 of oxide of iron, equal to 51.95 metallic iron; 2.10 of oxide of manganese, equal to 1.46 of manganese and 0.58 of phosphoric acid. Yet another of Etzmannsberg ore as 75.26 of oxide of iron, yielding 52.68 of metallic iron. The various specimens of rolled iron are all of excellent quality and reflect credit upon the respective works at which they have been produced.

Coal Beds on Puget Sound.—A writer in *Olympia*, Washington Territory, says: The second great source of wealth of the Puget Sound region is the coal field lying back of its eastern shores upon against the base of the Cascade Mountains. Its width is from 10 to 20 miles, and its length, when fully explored, will probably be found to be as great as that of the Sound itself, reaching from Carbonado northward to and beyond the British line, a distance of over 100 miles. At two points upon this field mining operations are carried on successfully by the aid of railroads to tide-water. The Central Pacific Railroad Company purchased recently, for \$500,000, the mines at Carbonado, about 20 miles east of Tacoma, and are shipping coal to San Francisco for the use of its locomotives. This coal is a true bituminous—hard, solid, black and clean, not equal in heat-producing capacity to the best Pittsburgh coal, but a good fuel for railroad and steamship purposes. It is transported to Tacoma over a branch line of the Northern Pacific, and thence forwarded by sailing vessels. A number of steam colliers will soon be put in this trade by the Central Company, and extensive coal docks are now being built at Tacoma. Several new companies are preparing to open mines in the Carbonado district. This industry, now in its infancy, seems capable of indefinite expansion to meet the demands of the coast cities and of the agricultural regions of the interior, which are destitute of good fuel. Back of Seattle, and reached by a narrow-gauge railroad, lies the Newcastle lignite field. The coal is of a younger formation, geologically speaking, than that of the Carbonado district. It comes out in line, clean, solid blocks, does not slack easily, like the brown coals of Dakota, and has about two-thirds the heat-producing quality of bituminous coal. It is used by steamships, and finds a ready market for domestic consumption. Mines and railroad are owned by the Oregon Improvement Company, which has also a large shipping dock at Seattle and runs a line of steam colliers to San Francisco.

The total output of the German collieries for the second quarter of the year was 1,271,204 tons, against 1,179,171 tons in the corresponding period of 1881. During the first three months of 1882, 2,596,306 tons were raised, showing an increase of 6 per cent. on the total of the preceding year during the same period.



LARGE DRAWING AND STAMPING PRESS, BUILT BY E. W. BLISS, BROOKLYN, N. Y.

utes; 22 per cent. in about 25 minutes, and not less than 20 minutes; while the remainder would take from half an hour to three-quarters of an hour to shut them, and in a few cases hours would be nearer the time. Of those observed, not 5 per cent. appeared to have been moved since the ship was built, being jammed with rust and paint, while those fitted with screws were in a hopeless state."

The foregoing was written by a practical man, whose range of inspection covered some 27 steam vessels actively employed in the East India waters and sailing under the British flag. In order to ascertain how far such severe criticism might apply to the steam fleet sailing from this port, several persons supposed to have a thorough acquaintance with the various intricate naval matters having a practical bearing on the question of the comparative safety of the present water-tight bulkhead system have been visited. Mr. Thomas Congdon, principal surveyor in the United States for *Lloyd's Register* of British and Foreign Shipping, said: "I am certain that no such state of things as has been reported in *Engineering* could exist in vessels surveyed and registered by us. When making our annual survey particular attention is paid to the working of the doors in the bulkheads; for, as you can see, in our regulations great stress is laid upon the point of examining the water-tight bulkheads in all their details. We not only examine the officers and engineers about the efficiency of the doors, sluices, &c., but we have them tested in our presence. The 'tun-

not so dangerous to the safety of the ship as those abate of midships. The present system is as near perfection as the ingenuity of man can devise, but, of course, there are many fortuitous, perilous conditions which attend navigation against which no human skill can provide. Many of the Atlantic steamers are not registered with us, but, I fancy, they are with some other company, and I feel warranted in saying that no such shameful state of affairs as is stated in the foregoing can be found aboard of any of our first-class Atlantic passenger steamers. Bulkheads and doors, with all their accompanying machinery, may be constructed in the highest degree of perfection, and yet, by neglect and stupidity, become worthless, and again, they may be perfect in all appearances, yet fail when needed. No skill can discount the action of the force of concussion when two vessels collide."

Mr. Samuel Holmes, iron shipbuilder and surveyor, said: "The steam vessels plying in the East India waters come home only once in 6 years to have new boilers, &c., and the officers, engineers and crews get careless, no doubt; the hot weather, too, makes them neglectful, and collision risks are not so great in that part of the world as about here or in European waters. In every well regulated steamer the doors should be worked every day, and the attending machinery well oiled. As much difference exists among steamships in this important respect as can be found among men generally. Engineers are no exception to the general rule, but neglect like that reported in the forego-

works. Fine castings for artistic and ornamental purposes were first attempted at the beginning of the present century, at the Royal Berlin Foundry. Loam was formerly the only material used for molds, being employed at the Harz ironworks as late as 1766, while in France sand rapidly gained favor for this purpose at about the same time. The tempering of cast iron, or the production of malleable cast iron, was accomplished some 80 years ago, a patent having been secured in 1804 by Lucas in England for the process. In Germany the method has been practiced since 1829. The iron foundry and enameling works of Bavaria in 1875 numbered 49, employing 2145 hands. The country is very rich in iron ores, various qualities of which are found under the usual geological conditions. The total ore produced by the 26 mines in 1880, was 73,560 tons. The most noteworthy and important is the "Erzzug," the principal point in this stratum being near Amberg, the mineral wealth of which place has contributed largely to the success of the ironworking in the Oberpfalz. Commencing at Altenricht and Haidweiher, the beds of ore stretch over Krumbach and Amberg, and in a northwesterly direction over Sieben-eichen, Lobenhof, Annaberg, near Sulzbach, to Etzmannsberg, Langenbruck, Auerbach to Sassenreuth, near Pegnitz, and extend in numerous directions over the Frankenjura. These ores are now worked at the royal mine on the Erzberg, near Amberg; the St. George's mine on the Lobenhof, near Rosen-berg; and the Etzmannsberg, near Sulzbach. There are also the Leonie mine near Auer-

**ANSONIA
BRASS & COPPER CO.,**
No. 19 Cliff Street,
Phelps Building, NEW YORK.

BRASS AND COPPER

IN
Sheets, Bolts, Rods, Wire, &c.
**Seamless Brass & Copper
Tubing.**

Ansonia Corrugated Stove Platforms.
PURE COPPER WIRE
For Electrical Purposes, Bare and Covered.
Phosphor Bronze Rods for Pumps, &c.

**ANSONIA ★ REFINED
INCOT COPPER.**

PHELPS, DODGE & CO.

IMPORTERS OF
**TIN PLATE,
ROOFING PLATE,**
Sheet Iron, Copper, Pig Tin Wire,
Zinc, &c.

MANUFACTURERS OF
COPPER AND BRASS.

CLIFF STREET, NEW YORK.

SCOVILL MFG CO

**BRASS,
HINGES, WIRE, GERMAN SILVER.**
PHOTOGRAPHIC GOODS.

**BUTTONS,
CLOTH AND METAL.**

DEPOTS: 419 & 421 Broome St., N. Y.
177 Devonshire St., Boston.
183 Lake St., Chicago.

FACTORIES:
Waterbury, Conn.
New Haven, Conn.
New York City.

DICKERSON, VAN DUSEN & CO.,

Importers of
Tin Plate, Pig Tin, Sheet Iron, Copper,
Wire, Zinc, Etc.

29 & 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

A. C. NORTHROP,
Waterbury, Conn.,
**NOVELTIES IN BRASS AND OTHER METAL GOODS
FOR HARDWARE TRADE.**

Wrought Iron and Brass Machine Screws; Turned, Hexagon, Round and Square Head Cap and Set Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass.
Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

WORKS

ROEBLING'S

AT
**TRENTON,
N. J.**

WIRE ROPE

New York Office
AND
Warehouse,

117 Liberty Street.

THE JOHN A. ROEBLING'S SONS CO.,

MANUFACTURERS OF

WIRE ROPE

OF
Iron, Steel and Copper,
FOR

Hoisting Purposes of all
kinds, for Ferries, Stays,
Ship Rigging, Sash Cords,
Lightning Rods, &c., &c.
Suspension Bridge Cables.

GALVANIZED

Telegraph Wire,
Market Wire,
Vineyard Wire.

Iron and Steel

WIRE

FOR
Market Wire, Fence Wire,
Bridge Wire, Chain Wire,
Buckle Wire, Spring Wire,
Rivet Wire, &c., &c.

CALVANIZED WIRE CLOTHES LINES.

BRODERICK & BASCOM ROPE CO.,

MANUFACTURERS OF

WIRE ROPE
BRODERICK & BASCOM ROPE CO.

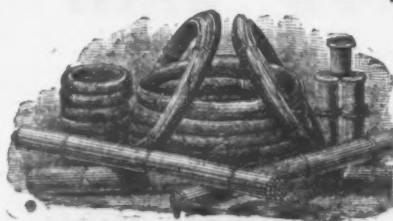
IRON WIRE ROPE, STEEL WIRE ROPE.
728 N. Main St., St. Louis, Mo.

WORCESTER WIRE CO.,

Manufacturers of

**IRON AND STEEL
WIRE**

For all Purposes.
WORCESTER, MASS.



Waterbury Brass Co.

CAPITAL - - \$400,000.

Sheet, Roll and Platers' Brass,
GERMAN SILVER,
Copper, Brass and German Silver Wire,
BRASS AND COPPER TUBING,
COPPER RIVETS & BURS,
BRASS KETTLES,

Door Rail, Brass Tags,
PERCUSSION CAPS,
POWDER FLASKS,

Metallic Eyelets, Shot Pouches, Tape Measures, &c.
And small Brass Wares of every Description.
Cartridge Metal in Sheets or Shells a Specialty.
Sole Agents for the

Capwell Mfg. Co.'s Line of Sport-
ing Goods.

DEPOTS: 296 Broadway, New York. Waterbury, Conn.
125 Eddy St., Providence, R. I.

**Detroit Copper & Brass
Rolling Mills.**

**BRAZIERS' AND SHEATHING COPPER,
ROLLED, SHEET & PLATERS' BRASS**

GERMAN OR NICKEL SILVER,
Copper Wire for Electrical and other purposes,
Brass and German Silver Wire,
Copper Rivets and Burs,

COPPER BOTTOMS FOR TEA KETTLES AND BOILERS,
Cor. Larned & Fourth Sts., Detroit, Mich.

NEW YORK AGENCY:
UNION HARDWARE CO.,
57 Chambers and 68 Rensselaer Sts.

ROME IRON WORKS,

Manufacturers of

**Brass, Gilding Metal, Cop-
per and German Silver**
(In Sheets, Rods, Tubing or Wire),

**COPPER & BRASS RIVETS
AND BURS.**

Rome, New York.

**The Plume & Atwood
Mfg. Company,**

MANUFACTURERS OF

SHEET and ROLL BRASS and WIRE,
German Silver and Gilding Metal,
Copper Rivets and Burs,
Copper Electrical Wire, Pins,
Brass Butt Hinges,
Jack Chain,
Kerosene Burners,
Lamp Trimmings, &c.

18 Murray Street, New York.
13 Federal Street, Boston.
109 Lake Street, Chicago.

Rolling Mill, Factories,
THOMASTON, Ct. WATERBURY, Ct.

Bridgeport Brass Co.,

MANUFACTURERS OF

Sheet and Roll Brass,
Brass & Copper Wire & Tubing,
German Silver Metal and Wire,
Copper and Iron Rivets.

OILERS and CUSPADORES, LAMPS and TRIMMINGS,
LANTERNS and TRIMMINGS, KEROSENE BURNERS,
Clocks & Fly Fan Movements, PLUMBERS' MATERIALS.
Particular attention paid to cutting out Blanks and
manufacturing Metal Goods.

MANUFACTORY, WAREHOUSE,
Bridgeport, Conn. 19 Murray St., N. Y.

HARRISON WIRE CO.,

ST. LOUIS, MO.,

MANUFACTURERS OF ALL KINDS OF

STEEL AND IRON

WIRE ROPE.

Holmes, Booth & Haydens,

WATERBURY, CONN.

NEW YORK, BOSTON,
49 Chambers St. 18 Federal St.

Manufacturers of all kinds of

**Brass, Copper & German Silver,
ROLLED AND IN SHEETS.**

BRASS & COPPER WIRE,
Tubing, Copper Rivets & Burs.

**BRASS & IRON
JACK CHAIN, DOOR RAIL.**

German Silver Spoons,
SILVER PLATED FORKS & SPOONS,
Kerosene Burners, &c.

JOHN DAVOL & SONS,

Agents for

Brooklyn Brass & Copper Co.,

Dealers in

Ingot Copper, Spelter, Lead, Tin,
Antimony, Solder & Old Metals.

100 John Street, New York.

PASSAIC ZINC CO.

Manufacturers of

Pure Spelter

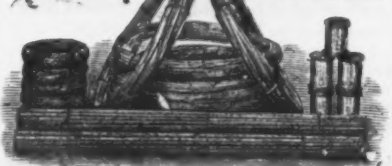
Cartridge Brass, Gas Fixtures, Bronzes
AND ALL FINE WORK.

Also for

Galvanizers & Brass Founders.
MANNING & SQUIER, Gen'l Agents,
113 Liberty Street, N. Y.

Geo. W. Prentiss & Co.,
HOLYOKE, MASS.,

IRON WIRE.



Bright, Coppered, Annealed and Tin
Plated. Also **GUN SCREW WIRE**
Of all sizes straightened and cut to order.

No. 35

BROWNING, SISUM & CO., 85 Chambers St.,
Manufacture
Belt Hooks, Cutters, Spring Keys, D Rings,
Staples, and everything pertaining to wire bending.
Factory, BROOKLYN.

PHILIP L. MOEN, President & Treasurer. CHARLES F. WASHBURN, Vice President & Secretary.

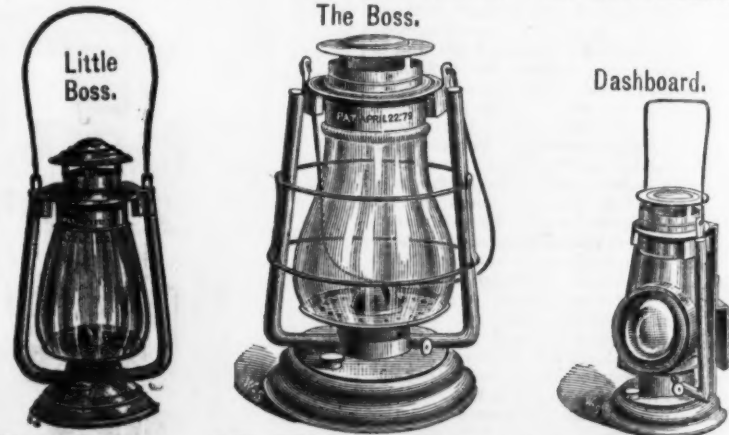
Washburn & Moen Mfg. Co.
Established, 1831. Capital, \$1,500,000
WORCESTER, MASS.

WIRE DRAWERS.
Patent Galvanizing, Rolling and Tempering.
MANUFACTURERS OF
IRON, AND IRON AND STEEL WIRE.
Of Every Description.

A SPECIALTY MADE OF
**GALVANIZED TELEGRAPH WIRE,
GALVANIZED TELEPHONE WIRE,
PATENT STEEL WIRE BALE TIES,
PATENT STEEL BARB FENCING,
AND PUMP CHAIN.**

WAREHOUSES: New York, 16 Cliff and 241 Pearl Street.
Chicago, 107 and 109 Lake Street.

"NATIONAL WIRE AND LANTERN WORKS."
HOWARD & MORSE,
MANUFACTURERS OF
THE "BOSS" TUBULAR LANTERNS.



Warehouse, 45 Fulton Street, New York.

ABRAM S. HEWITT, President.
WM. HEWITT, Vice President.

JAMES HALL, Treasurer.
E. HANSON, Secretary.

**THE
TRENTON IRON COMPANY,**
(INCORPORATED 1847),
TRENTON, N. J., Manufacturers of

IRON and STEEL WIRE

OF ALL GRADES,

BRIGHT, ANNEALED, COPPERED, TINNED AND GALVANIZED.

Iron and Steel Wire Rods;

EXTRA QUALITIES OF BAR IRON AND RODS.

Best Qualities of Gun-Screw and Charcoal Iron Wire;
Crucible, Siemens-Martin and Bessemer Steel Wire.

Wire Straightened and Cut to Lengths.

New York Office, COOPER, HEWITT & CO., 17 Burling Slip.
Philadelphia Office, JOHN HEWITT, Agent, 21 North Fourth St.

IRON AND STEEL WIRE ROPE

For Hoisting, Running & Standing Ropes, Ferries, &c.

CONSTANTLY KEPT ON HAND.

Address: **HAZARD MFG. CO.,** Wilkesbarre, Luzerne Co., Pa.

FELTEN & GUILLEAUME,

Carlswerk, near Cologne, Germany.

PATENT CRUCIBLE STEEL WIRE,

For Mining and Flow Ropes, Hawsers and Bridge Cables.

SIEMENS-MARTIN AND BESSEMER STEEL WIRE,

Flusseisen, Swedish and German Charcoal Wire.

GALVANIZED TELEGRAPH WIRE

of Charcoal and Swedish Iron and Steel, also with high conductivity, and in long lengths.

GALVANIZED STEEL WIRE,

For Plain, Bar and Strand Fencing, 3, 4 and 7-ply Strand, Staples, &c. Annealed and Oiled Fencing
Wire, round and oval.

WIRE ROPE

OF EVERY DESCRIPTION.

TELEGRAPH CABLES.

Contractors to the German and Foreign governments. The oldest house in the branch on the Con-
tinent. **Telegraph Address, CARLSWERK, COLOGNE.**

General Agents for U. S. and Canada,

PERKINS & CHOATE, 23 Nassau St., N. Y.

A. LESCHEN & SON,

Manufacturers of

WIRE ROPE

OF EVERY DESCRIPTION.

919 to 923 N. Main St. ST. LOUIS, MO.

Correspondence invited.



O. LINDEMANN & CO.,
Manufacturers of all kinds of
Japanned, Brass & Tin Plated
BIRD CAGES.
Catalogues furnished to the trade.
254 Pearl St.,
NEW YORK.

CARY & MOEN,
Manufacturers of
STEEL WIRE for all purposes and **STEEL SPRINGS** of every description.

Market Steel Wire, Crinoline Wire, tempered and covered.
Also Patent Tempered Steel Furniture Springs, constantly on hand.
234, 236 and 238 West 29th Street, NEW YORK

The Levett-Müller Electric Lighting System.
The Levett-Müller Electric Light Company, 540, 546 West Sixteenth street, New York City, are manufacturing a dynamo machine which, in many respects, is worthy of most careful attention, and is certainly capa-

armatures and cores overlap the field magnets in such a way that they are not released from the influence of one before passing under the following one. The magnets present alternate poles to the armatures, and there is no opportunity of reversing the current, the secondary current in one case passing through the coils in the same direction as the

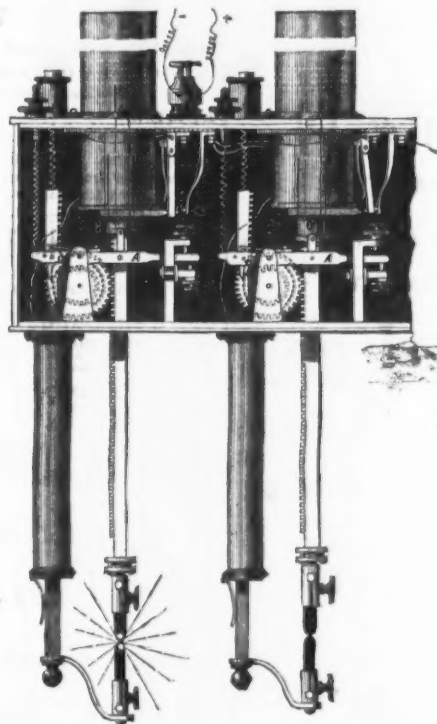


Fig. 1.—The Levett-Müller Continuous Arc Lamp.

ble of producing some very desirable results. Some of the claims made by the company for their machines are so surprising that, at first sight, it seems impossible to obtain such results. Perhaps one of the leading claims will give a clear idea of the character of the whole of them. The inventor, Mr. Hans J. Müller, claims to make a machine in which the current is not only divided, as if it came from several independent machines, but it is

current produced by the following magnet. In other words, what would be the secondary current is in the same direction as that induced by the following magnet. This inclination of the armature cores is the subject of a very important patent which was recently granted to Mr. Müller in an interference case with the United States Electric Light Company. By the use of this arrangement it is claimed that a very considerable

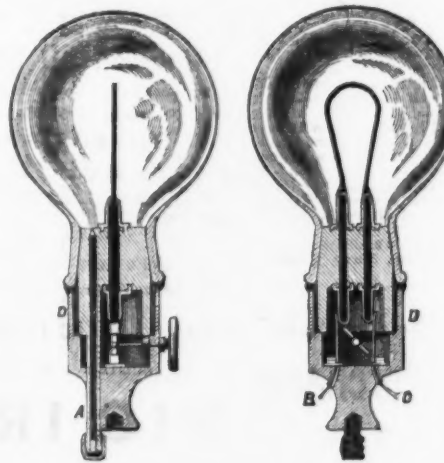


Fig. 2.—The Levett-Müller Incandescent Lamp.

divided to produce quantity or to produce intensity, as the case may be. In a machine which we saw at work recently, there are 12 field magnets disposed in six pairs. There are 24 armatures connected with four commutators, so divided as to give six to each. When this machine is arranged for intensity the current passes through all in succession, but when it is necessary to obtain quantity only, each one goes directly to the commutator. In other words, the machine is divided into

saving in power is effected in producing a given amount of current. In one of these machines, for plating purposes, no small amount of advantage is to be gained on account of the possibility of varying the intensity and quantity without the necessity for the introduction of resistance coils. The machine, it is said, solves in a very convenient way the question of subdividing the electric current in an economical manner. Among one of the advantages for lighting which the

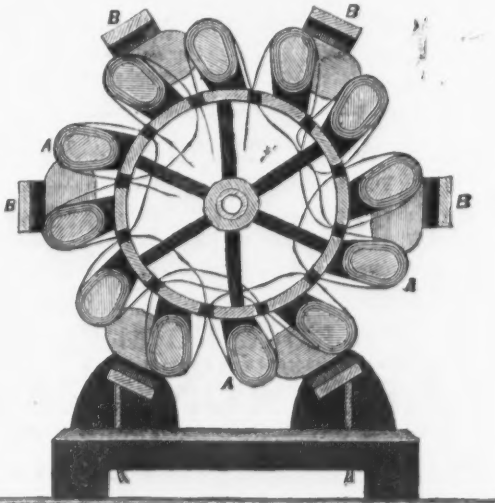


Fig. 3.—Transverse Section of the Levett-Müller Dynamo.

four or more different and separate machines, so far as the connections are concerned. The current then can be sent in succession through each one of the sections or taken directly from each. The machine, therefore, resembles, in some respects, an ordinary battery, which may be connected either for intensity or for quantity, as may be desired. It is even possible to connect a portion of the machine for quantity and another portion for intensity, and thus from the same machine to obtain a current capable of plating, another suitable for incandescent light, and a third current for supplying arc lights. The armatures are oblong in section and are arranged so as to be placed at an angle to their line of motion. That is, they cut "shear-like" across the line of force. These

company claims is that are lights of from 200 to 100,000 candle-power can be produced at the same time that incandescent lights of from 10 to 16 candle-power are being supplied from the same machine, either on the same circuit or separate currents. For steamers and railway trains, where enormous head-lights are needed and comparatively small lights for other purposes, they of course would be a very great convenience. In some experiments which we recently witnessed in connection with this machine, we saw what struck us as rather a remarkable combination. It was a large arc light in the same circuit as a dozen or more Edison incandescent lights. Both seemed to work in a most perfect manner, and the lights were exceedingly satisfactory. By means of

POWER PRESSES, RIVET MACHINES,
Special Machinery to Order.
BLAKE & JOHNSON,
WATERBURY, CONN.

IRON and BRASS RIVETS, STUDS, PINS, &c.,
For Manufacturers of Light Hardware.

POPE, COLE & Co.
BALTIMORE COPPER WORKS,
No. 57 South Gay St., BALTIMORE, MD.,
Have always on hand and for sale
INGOT COPPER,
Also Cakes, of unequalled purity and toughness.

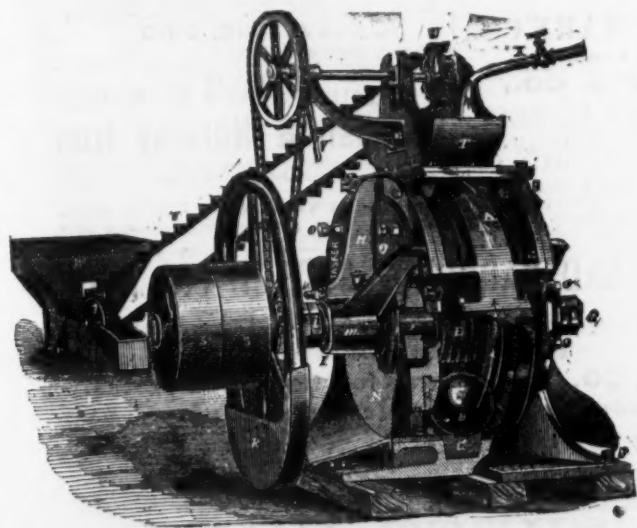


G. Gunther,
Manufacturer of
Patented Brass, Silver Plated and Japanned
BIRD CAGES.
Can be nested for export shipments.
46 Park Place,
NEW YORK.

Largest variety in patterns and unsurpassed in low prices. New Illustrated Catalogues and Price Lists on application.
FOUNDREYEN'S METALLIC Pattern Letters and Figures,
To put on patterns of castings. All sizes. Reduced prices. Mfd. by H. W. Knight, Seneca Falls, N.Y.

The "PERNOT SPRING STEEL" produced by the **GAUTIER STEEL DEPARTMENT** of Cambria Iron Co., Johnstown, Pa., has obtained a high reputation through its admirable qualities.

(No. 20.)



THOMPSON'S PATENT
FOR
Wet Pulverization of Rocks, Ores, Rolling Mill Fix
AND OTHER MATERIAL,
EITHER COARSE OR TO AN IMPALPABLE POWDER.
STEPHEN P. M. TASKER,
SOLE MANUFACTURER,
Care of MORRIS, TASKER & CO., Limited,
PHILADELPHIA, U. S. A.

Centrifugal force applied to a rolling ball for the purpose of pulverizing. Tested thoroughly and guaranteed to yield a greater product of pulverized material of equal fineness in a given time with less wear, less power, less first cost and less cost for repairs than stamps or any other pulverizer.

Bergen Port Spelter.
MINES: Lehigh Valley, Pa. WORKS & FURNACES: Bergen Port, N. J.
The only Miners and Manufacturers of
PURE LEHIGH SPELTER
From Lehigh Ore.
Especially adapted for
Cartridge Metal and German Silver.
Also manufacturers of
BERGEN PORT OXIDE ZINC.
Superior for LIQUID PAINT on account of its body and wearing properties.
BERGEN PORT ZINC CO.
E. A. FISHER, Agent, 13 Burling Slip, N. Y.

CALVIN WELLS, President. A. MEANS, Manager.
ILLINOIS ZINC CO.,
MANUFACTURERS OF
SHEET ZINC,
PERU, ILLINOIS.
E. A. FISHER, . . . Agent,
13 Burling Slip, New York.

J. A. EMERICK, HOWARD EVANS,
MANUFACTURERS
MOLDERS' TOOLS, FOUNDRY FACING, MOLDING SAND, FOUNDRY SUPPLIES,
J. A. EMERICK & CO.,
1056 to 1076 Beach St., PHILADELPHIA.

ESTABLISHED 1837. H. S. CHASE, Sec'y. INCORPORATED 1876. C. F. POPE, Treas.

Waterbury Mfg. Co.,
WATERBURY, CONN.
Brass Goods.
MENDEN & SCHWERTZ IRON AND STEEL WIRE WORKS,
AT SCHWERTZ, WESTPHALIA, GERMANY.
The largest Wire Works in the world. Make, on 12 trains, STEEL AND IRON WIRE RODS of all dimensions down to No. 8 and 9, Stubbs gauge. Also, FINE IRON, HOOP IRON, BAR IRON in all dimensions and qualities.
SOLE AGENTS FOR THE UNITED STATES:
WOLTMAN & MICKERTS, ST. LOUIS, MO.

OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

Iron and Steel

Of every description kept in stock.

Agents for Park Brother & Co.'s

BLACK DIAMOND STEEL.

All sizes of Cast and Machinery Steel constantly on hand.

PIERSON & CO.,

Established 1790,

24 & 26 Broadway, 77 & 79 New St.

NEW YORK CITY.

Ulster Iron.

All Sizes and Shapes kept in Stock.

ABEEL BROS.,
190 South St., 365 Water St.,
NEW YORK.**ALLENTOWN
SHAFTING.**And all sizes of
CATASAUQUA
"ULSTER"
"REFINED"
COMMON &
NORWAY IRON
KEPT IN STOCK.
STEEL OF ALL KINDS.**A. R. WHITNEY & CO.,**

Manufacturers of and Dealers in

IRONOur specialty is in
Manufacturing Iron Used in the Con-
struction of Fire-Proof Buildings,
Bridges, &c.Agents for Carnegie Bros. & Co. Limited,
Wrought Iron Beams and Channel Iron, Bay
State Iron Co., Boiler Plate and Tank Iron, Nor-
way Steel and Iron Works, Homogeneous Steel
Plates and Compressed Steel Shafting, Glasgow
Tube Works, Boiler Flues, A. M. Byers & Co.'s
Wrought Iron Pipe, H. P. Nail Co.'s Wire Box
Nails, Altoona Iron Co.'s Refined Bars, Rods,
Hoops, Bands, &c. Samson Iron Works, Refined
Bars.Plans and estimates furnished, and contracts
made for erecting Iron Structures of every descrip-
tion. Books containing cuts of all iron made sent
on application by mail. Please address
Sample pieces at office. 85 Hudson Street, New York.**BORDEN & LOVELL,
Commission Merchants**

70 & 71 West St.,

New York.

Agents for the sale of

**Fall River Iron Co.'s Nails,
Bands, Hoops & Rods.**

AND

**Borden Mining Company's
Cumberland Coals.****WILLIAM H. WALLACE & CO.,
IRON MERCHANTS**

Cor. Albany & Washington Sts.

NEW YORK CITY.

WM. H. WALLACE.

WM. BISHOP.

DANIEL W. RICHARDS & CO.,

FOREIGN AND DOMESTIC

SCRAP IRON, RAILS, STEEL AND METALS.

Yards and Office, 88 to 96 Mangin St., NEW YORK.

DANIEL W. RICHARDS.

MORTON B. SMITH.

**PASSAIC ROLLING MILL CO.,
ROLLED IRON BEAMS,
Channels, Angles, Tees, Merchant Bars, Riveted Work, For-
gings, Eye Bars, &c.
PATERSON, N. J.
Room 45, Astor House, New York.****CUT NAILS,**

Hot Pressed Nuts, Bolts, Washers, &c.

DOVER IRON CO.'S

BOILER RIVETS,

Boiler Brace Jaws, Socket Bolts, &c.

FULLER BROTHERS & CO.

139 Greenwich Street, New York.

A. B. Warner & Son,**IRON MERCHANTS,**

28 & 29 West and 52 Washington Sts.

IRON & STEEL BOILER PLATE.**BOILER TUBES,**Angle, Tee and Girder Iron,
Boiler and Tank Rivets.

Sole Agents for the celebrated

LUKENS, PENNOCKS,
"WAWASSET," "EUREKA,"brands of Iron. Also all descriptions of Plate, Sheet,
and Gasometer Iron. Special attention to Locomotive
iron. Fire Box Iron a specialty.**ROME MERCHANT IRON MILLS,**

ROME, N. Y.,

Manufacturers of the best grade of

Bar Iron, Bands and Fine Hoops.scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and
Horse Shoe Iron. Also from Charcoal Pig a superior
quality of iron branded J. G. All puddled balls re-
duced by hammer. Orders may be sent to the Mill or
to J. O. CARPENTER, our Agent, at 59 John
Street, New York.**FOX & DRUMMOND,****IRON,****TIN PLATES,**

AND

METALS.

68 WALL STREET, - NEW YORK.

Marshall Lefferts & Co.,

90 Beekman St., New York City,

MANUFACTURERS OF

Galvanized Sheet Iron,

Best Bloom, Best Refined and Common.

Galvanized Wire, Telegraph and Fence; Galvanized
Hoop and Band Iron, Galvanized Rod and Bar Iron,
Galvanized Sails, Galvanized Chain, Galvanized Iron
Pipe.**CORRUGATED SHEET IRON**

For Roofing, &c., Galvanized, Plain or Painted.

Best Charcoal, Best Refined and Common

SHEET IRON.

Plate and Tank Iron,

C No. 1, C H No. 1, C H No. 1 Flange, Best Flange.

Best Flange Fire Box, Circles.

ALL DESCRIPTIONS OF

Iron Work Galvanized or Tinned to Order.

Price list and quotations sent upon application.

JAMES WILLIAMSON & CO.,

SCOTCH AND AMERICAN

PIC IRON,

No. 69 Wall St., New York.

ULSTER IRON WORKS,

90 Broadway, New York.

Tuckerman, Mulligan & Co**CARMICHAEL & EMMENS**

130, 132 & 134 Cedar St., New York, and

Nos. 21, 23, 25 & 27 West Lake St., Chicago, Ill.

DEALERS IN

IRON AND STEEL BOILER PLATE.

Lap-Welded Boiler Tubes, &c. &c.

Agent for Otto's celebrated Cast Steel Boiler Plates,
The Colesville Iron Co. The Laurel Rolling Mills,
and Union Tube Works; Wrought Iron Beams,
Angles, Tees, Rivets, &c.**OXFORD IRON CO.,**

(B. G. CLARKE, Receiver.)

Cut Nails

AND

SPIKES.

J. S. SCRANTON, Sales Agent,

21, 23 and 25 Washington Street,

NEW YORK.

JOHN W. QUINCY & CO.,

92 William Street, New York.

Anthracite & Charcoal Pig Irons,Wrought Scrap, Cut Nails, Copper,
BLOCK TIN, LEAD, SPelter, ANTIMONY, NICKEL, &c.**HARRISON & GILLOON**

IRON AND METAL DEALERS,

558, 460, 462 WATER ST., & 302, 304, 306 CHERRY ST.,

NEW YORK.

have on hand, and offer for sale, the following:
Scotch and American Pig Iron, Wrought, Cast and
Machinery Scrap Iron, Car Wheels, Axles and Heavy
Wrought Iron; also old Copper, Composition, Brass,
Lead, Pewter, Zinc, &c.**BURDEN'S
HORSE SHOES.****"Burden Best"
Iron****Boiler Rivets.****The Burden Iron Company**

Troy, N. Y.

EGLESTON BROS. & CO.,

166 South Street, NEW YORK CITY.

267 Front Street,

BURDEN'S**H. B. & S.****ULSTER BAR IRON.**

All sizes and shapes in stock.

Also Best Grades of

Am. & Eng. Ref'd Iron, Common Iron, &c.

VOUGHT & WILLIAMS,

288 Greenwich Street,

NEW YORK,

Dealers in

BAR IRON AND STEEL,

Tire, Spring, Toe Calk,

MACHINERY AND TOOL STEEL.

ALL BRANDS OF HORSE NAILS,

Horse Shoes, Raps and Files,

Bellows, Anvils, Vises, Blowers, Tire Benders,

Upright Drills, Hammers, Sledges, Crow Bars,

Pinchers.

B. F. JUDSON,

Importer of and Dealer in

SCOTCH AND AMERICAN

Pig Iron,

Wrought & Cast Scrap Iron,

OLD METALS.

457 & 459 Water St., NEW YORK.

223 & 225 South St.,

Manhattan Rolling Mill.

J. LEONARD,

445 to 451 West St., 177 & 179 Bank St.,

NEW YORK,

Manufacturers of

HORSE SHOE IRON,

Toe Calk Steel,

Rods, Ovals, Half Ovals and Flats.

DANIEL F. COONEY,

88 Washington St., N. Y.

BOILER PLATES AND SHEET IRON,

LAP-WELDED BOILER FLUES,

Boiler Rivets, Angle & T Iron, Cut Nails & Spikes.

Agency for Glasgow Iron Co., Jos. L. Bailey & Co.,

First Iron Works, Lebanon Rolling Mills, Chester

Pipe and Tube Co., Albany & Sons. Iron & Steel Co.'s

celebrated Boiler Rivets; Homogeneous Steel, Boiler

and Fire Box Plates.

W. D. WOOD & CO.'S

PATENT

Planished Sheet Iron.Patented March 14th, 1865; April 8th, 1873;
Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876.

Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,

and at a much less price.

FOR SALE,

by all the principal

METAL DEALERS

In the Large cities throughout

THE UNITED STATES.

And at their Office,

111 Water Street, PITTSBURGH, PA.

C. KANE,

OLD RAILS, SCRAP IRON, STEEL,

PIC IRON, BLOOMS,

AND ORE.

PITTSBURGH, PA.

WATSON IRON WORKS.

LIGHT GRAY IRON CASTINGS

AND

Metal Pattern Making.

Bridgeport, Conn.

CORRUGATED AND CRIMPED IRON

ROOFING & SIDING,

Iron Buildings, Roofs,

Shedding, Doors, Cornices,

Scaffolding, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.,

5 Day Street, New York.

CANTON

COLD BLAST

CHARCOAL SCRAP

BLOOMS.

For Bars, Plates, Sheets & Rods

of Double Extra Quality Iron.

NONE BUT CHOICEST MATERIAL USED.

Address,

CANTON BLOOMARY CO.,

Collinsville, Conn.

F. W. JESUP & CO.,

Railway Supplies and Equipment.

No. 67 Liberty St., NEW YORK.

Agents NASHUA IRON AND STEEL CO.,

Manufacturers of

STEEL LOCOMOTIVE TYRES, HOMOGENEOUS

STEEL BOILER PLATES, IRON AND STEEL AXLES,

CRANK PIN, PISTON RODS, SLIDES, &c.

IRON AND STEEL LOCOMOTIVE FORGINGS.

GLENGARNOCK AND CARNBROE SCOTCH PIG IRON

For spot delivery and for prompt or forward shipments to New York, Boston, Philadelphia,

Baltimore or New Orleans. For sale in lots to suit by

JAMES LEE & CO., Sole Agents for the United States.

72 Pine Street, NEW YORK.

101 Milk Street, BOSTON, MASS.

LEECHBURG IRON WORKS.

KIRKPATRICK & CO.,

Manufacturers of all grades of

FINE SHEET IRONS,

(Refined Cold Rolled, Show Card, Stamping, Tea Tray, Polished, Shovel, Ferrule Iron, &c.)

NATURAL GAS USED AS FUEL.

OFFICE, No. 145 First Ave., Pittsburgh, Pa.

CHARLES HUBBARD,

"Sheridan" & "Leesport" Brands Pig Iron,

WHITE IRON (Anthracite & Bessemer) Stock for Making Strong Castings.

"CHARCOAL" PIG IRON "MAIDEN CREEK" and "GARRICK" BRANDS.

FAVORITE BRANDS OF SCOTCH PIG, IN STOCK AND TO ARRIVE.

Old Car Wheels, Best Brands.

46 Cliff Street, New York City.

JAMES W. ROSS,

IMPORTER OF AND FURNACE AGENT FOR

SCOTCH AND AMERICAN PIG IRON.

MANUFACTURERS' AGENT OF

Bar Iron, Car Wheels, Axles, Rails and Railroad Supplies.

SOLE AGENT

WHITAKER IRON COMPANY

OF WHEELING, W. VA., MANUFACTURERS OF

SHEET IRON, TANK AND FIRE BED,

36 DEARBORN STREET, CHICAGO.

JOHN J. SPENCER, President.

ALEXANDER BURNS, Manager.

THE JERSEY CITY GALVANIZING CO.,

MANUFACTURERS OF

GALVANIZED MATERIAL OF EVERY DESCRIPTION.

GALVANIZING IN ALL ITS BRANCHES.

Galvanized Sheet Iron—Best Bloom, Best Refined, Common. Galvanized Round, Square Band and

Hoop Iron, &c., &c.

All Sizes

of Corrugation

from

1 1/2 to 5 inches.

Corrugated Sheet Iron a Specialty. Galvanized, Black and Painted. Iron Corrugated for the Trade.

Estimates furnished on application

WORKS, GREEN AND BAY STREETS, JERSEY CITY, N. J. OFFICE AND WAREHOUSE, 98 JOHN STREET, NEW YORK.



SNOW SHOES

ROADSTER

PATTERN.

STEEL TOE CALKS.

Extra Quality Homogeneous Steel

BOILER PLATE

STEEL PLATES, all descriptions,

Cut Nails and Spikes, Plate and Sheet

Iron, all descriptions.

SHOENBERGER & CO.,

Pittsburgh, Pa.

KEYSTONE ROLLING MILL, Limited

Manufacturers of

IRON

Pittsburgh, - - - Pa.

Bonnell, Botsford & Co.,

Iron, Nails & Spikes.

YOUNGSTOWN, OHIO.

MANN & JONES,

4 Hanover St., New York,

GENERAL IRON BROKERS

And Commission Merchants.

W. S. MIDDLETON,

Broker in Machinery & Iron

Siemens' Regenerative GAS FURNACE.

RICHMOND & POTTS,
119 S. Fourth St., PHILADELPHIA, PA.

HENRY LEVIS & CO., Manufacturers' Agents

For Iron and Steel Rails, Car Wheels, Boiler and
Sheet Iron and General Railway
Equipments.
Old Rails, Axles, and Wheels bought and sold.
234 S. 4th St., Philadelphia.

The Cambria Iron and Steel Works,

Having enjoyed for over TWENTY-FIVE YEARS the reputation of producing the best quality of

RAILS,

have now an annual capacity of

230,000 Tons of Iron and Steel Rails, Splice Bars, &c.

ADDRESS,
CAMBRIA IRON COMPANY,
No. 218 South 4th Street, Philadelphia.

Or at the Works, JOHNSTOWN, PA.

Or LENOX SMITH, New York Selling Agent, 46 Pine St., N. Y.

THE PHOENIX IRON CO.,

410 Walnut Street, PHILADELPHIA.

Manufacturers of Wrought Iron

Beams, Deck Beams, Channels, Angle & Tee Bars,

STRAIGHT AND CURVED TO TEMPLATE.

Largely used in the construction of Iron Vessels, Buildings and Bridges.

WROUGHT IRON ROOF TRUSSES, GIRDERS & JOISTS,

and all kinds of Iron Framing used in the construction of Fire Proof Buildings,

PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,

and built up shapes for Iron Bridges.

REFINED BAR, SHAPING, and every variety of SHAPE IRON made to order.

Plans and Specifications furnished. Address **DAVID REEVES, President.**

NEW YORK AGENTS, MILLIKEN & SMITH, 95 Liberty Street.

BOSTON AGENTS, FRED. A. HOUDLETTE & CO., 19 Battery March St.

ALAN WOOD & CO.,

MANUFACTURERS OF

Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom

PLATE & SHEET IRON.

No. 519 Arch St., Philadelphia, Pa.

Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack,
Tank and Boat Iron; Last, Stamping, Ferrule, Locomotive Headlight and Jacket Iron.



JAS. ROWLAND & CO.,

Kensington Iron, Steel & Nail Works,

220 North Delaware Ave., - PHILADELPHIA,

Manufacturers of the

ANVIL BRAND REFINED MERCHANT BAR IRON.

Also, the James Rowland & Co. Kensington Nails, cut from
their Refined Anvil stock. Also, Flow and Cultivator Steel; Skelp
Iron a specialty; also Rounds, Squares, Flats, Bands and Hoop
Iron.

PENCOYD IRON WORKS.

A. & P. ROBERTS & CO.,

Manufacturers of

CAR AXLES.

BAR, ANGLE, TEE AND CHANNEL IRON.

Office, No. 265 S. Fourth St., Philadelphia. Agents for the sale of Glamorgan Pig Iron.

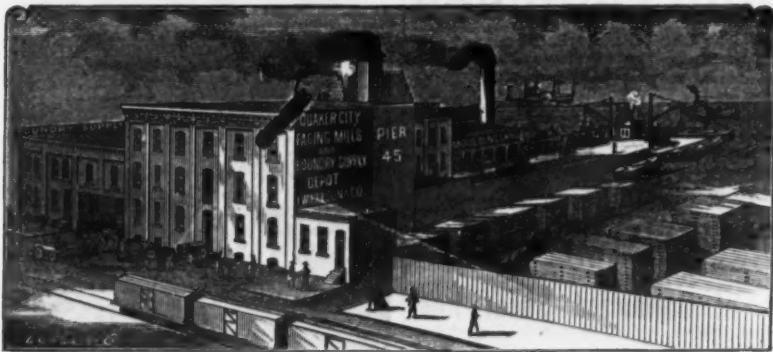


J. W. PAXSON & CO.,

DEALERS IN

MOULDING SAND,

1021 North Delaware Avenue, PHILADELPHIA, PA.



XX MINERAL,
XX MINERAL,
IXL FACING,

MANUFACTURERS
CHARCOAL FACING,
ANTHRACITE FACING,
SOAPSTONE,

LEAD FACING,
RIBBLES, SHOVELS,
STEEL BRUSHES.

ALLENTOWN ROLLING MILL COMPANY,

Manufacturers of

Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes,
Rivets, Bolts and Nuts, &c. Bridges and Turn Tables.

General Office, 237 South Third St., Philadelphia.

Works at Allentown, Pa.

JAMES C. BOOTH.

THOMAS H. GARRETT.

ANDREW A. BLAIR.

BOOTH, GARRETT & BLAIR, Analytical and Consulting Chemists,

919 and 921 Chant St. (10th St. above Chestnut St.), PHILADELPHIA PA.

Established in 1836.

Analyses of Ores, Waters, Metals and Alloys of all kinds. A special department for the

ANALYSIS OF IRON AND STEEL,

fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron Steel, Iron
Ores, Slags, Limestones, Coals, Clays, Fire Sands &c. Agents for sampling ores in New York and
Baltimore. Price lists on application.

CHEMICALS AND APPARATUS FOR THE ANALYSIS OF

ORES, IRON, STEEL, FUEL, FLUXES, FURNACE GASES, &c.,

Our Specialty. Being direct Importers and Manufacturers we can offer superior inducements.

EIMER & AMEND, Nos. 205 to 211 Third Avenue.

NEW YORK.

Eighteenth Street Station Elevated R. R.
Illustrated Catalogue Mailed on Application.

Edward J. Etting,

IRON BROKER AND COMMISSION MERCHANT,

230 S. Third St., Philadelphia, Pa.

Pig, Bar and Railroad Iron.

OLD RAILS, SCRAP, &c.

Agent for the

MOUNT SAVAGE FIRE BRICK,

The Allentown Iron Co. and

The Coleraine Furnaces.

STORAGE WHARF AND YARD

DELAWARE AVENUE ABOVE CALLOWHILL STREET,

connected by track with railroad.

Cash advances made on Iron.

Established 1837.

A. PURVES & SON,

Dealers in

Scrap Iron, Metals and Machinery

Cor. South and Penn Sts., Philadelphia,

Offer for sale in large or small lots, quantities to

suit, Old Machinery, Red Scrap Brass (selected), Old

heavy Yellow Scrap Brass, Ingot Red Brass (best quality),

Ingot Yellow Brass, Ingot Gun Metal made

strictly from old cannon.

D. W. R. READ & CO.,

Importers and dealers in

FOREIGN & NATIVE

BESSEMER ORES.

PIG IRON ENGLISH FIRE BRICK.

205 1/2 Walnut St., PHILADELPHIA.

142 Pearl St., 57 Gracechurch St., 67 S. Gay St.,

NEW YORK. LONDON. BALTIMORE.

J. J. MOHR,

Sole Agent for

Sheridan, Leesport, Ring-

gold and Lynchburg,

BESSEMER, FOUNDRY AND FORGE

PIG IRON,

Jefferson and Mt. Penn Cold Blast

Car Wheel Charcoal Pig Iron.

430 Walnut St., PHILADELPHIA, PA.

NORTH BROS.,

23d and Race Sts., Philadelphia.

Fine Light and Medium-Weight GRAY

IRON CASTINGS to order.

Correspondence solicited.

ISAAC V. LLOYD. JAS. G. LINDSAY.

LLOYD & LINDSAY,

No. 328 Walnut St., PHILADELPHIA,

Brokers and General Dealers in

Iron and Steel, Railway Equipments and

Supplies, Bar, Plate and Sheet Iron, Pig

Iron, Rails and Fastenings, Muck Bars, &c.

Florida Yellow Pine, cargo lots.

J. O. RICHARDSON,

No. 232 Dock St., Philadelphia,

DEALER IN

Pig Iron, Merchant Bar Iron

and Iron Ores.

J. W. HOFFMAN & CO.,

Iron Merchants & Railway Equipments.

208 South Fourth St., Philadelphia.

Sole agents Glasgow Iron Co. and Pine Iron Works

manufacturers of Muck Bar and all grades of Plate

Iron. Celebrated "Glasgow" and "Pine"

brands for fire boxes and difficult casting. Pig and

Bar Iron, Rails and all shapes in Iron. Quotations

given on Bridge and Building Specifications.

Langhorne Wister. Rodman Wister. J. N. M. Shimer.

L. & R. WISTER & CO.,

IRON BROKERS.

Scrap Iron a Specialty.

Agents for the Clearfield Fire Brick Co.'s

Fire Bricks.

No. 330 South 4th St., Philadelphia.

FRANCIS WISTER,

Sole Eastern Agent for

A. A. HUTCHINSON & BRO.

CONNELLSVILLE COKE

ORES, Native and Foreign.

230 South Third Street, Philadelphia.

ANDOVER PIG IRON,

FOR BEST MILL PRODUCTS.

Andover Chill Iron for Carwheels, &c.

Each pig marked exact chill depth (3/4 inch to 1/2

inch), A. Whitney & Son's standard test.

F. A. COMLY, Treas. J. WESLEY PULMAN, Asst. Sec.

407 Walnut St., PHILADELPHIA.

THE AMERICAN MACHINE CO.,

MANUFACTURERS OF

HARDWARE SPECIALTIES.

Office and Factory

Lehigh Ave. and American St., Philadelphia.

Branch House:

No. 128 Chambers St., New York

SPECIALTIES: Fluting Machines, Hand Fluters, Plaiting

Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs.

Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers

and Cake Mixing Machines.

J. F. BAILEY & CO.,

216 South 4th Street, PHILADELPHIA.

SELLING AGENTS,

Pottsville Iron & Steel Co.'s Beams, Angles, Channels, Rails and Bars,

A. & P. ROBERTS & CO.'S

Car Axles, Plates, Channels, Tees, Angles and Bar Iron.

Universal and Sheared Plates for Bridge and Other Work.

Special attention given to all kinds of Structural Irons.

CHAINS.

Special attention given to the Manufacture of Chains for

Crane Chains; Mining and Dredging Chains; "D. B. G." Special

JUSTICE COX, Jr. CHARLES K. BARNES.

JUSTICE COX, JR. & CO.,

AGENTS FOR

CHICKIES, ST. CHARLES, MONTGOMERY

WARWICK, CONEWAGO AND KEYSTONE

Foundry & Forge Pig Iron.

SHAWNEE ROLLING MILL CO., Limited,

Best Quality Muck Bar.

CATASAUQUA MFG. CO.'S

Bar, Angle, Skelp and Sheet Iron.

Railroad Car Axles. New and Old Rails.

No. 333 Walnut St., Philadelphia.

PETER WRIGHT & SONS,

307 Walnut Street, Philadelphia,

55 Broadway, New York,

44 Second Street, Baltimore,

Importers of

German and English

SPIEGELEISEN,

Pig, Scrap,

NEW AND OLD RAILS,

And Iron Ore.

JEROME KEELEY & CO.,

305 Walnut Place, Philadelphia.

SELLING AGENTS FOR

CHARCOAL and ANTHRACITE BLOOMS, PIG IRON,

BAR IRON, SHEET IRON, STEEL and IRON RAILS,

IRON CLAD STEEL RAILS and BARS, MAGNETIC

and HEMATITE IRON ORES, FIRE BRICK, COAL

and "OKE" MUCK BARS. Handle Old Iron and Steel

Balls, Scrap Iron, &c. Examine and negotiate sales of

Iron and Coal properties.

E. H. Wilson. A. Kaiser. J. B. M. Hiron.

E. H. WILSON & CO.,

BROKERS AND DEALERS IN

IRON AND STEEL.

Correspondence solicited.

BLAKEY & WALBAUM,

206 S. Fourth St., PHILADELPHIA.

SPECIALTIES

NEW AND OLD RAILS,

BLOOMS, BESSEMER PIG,

Spiegeleisen Iron Ores

AND

Railroad Supplies Generally.

THE

STANDARD

STEEL

WORKS.

LOCOMOTIVE AND CAR WHEEL TIRES.

Manufactured from the celebrated OTIS STEEL.

BRAND

STANDARD.

Quality and efficiency fully guaranteed. Prices as

low as any of the same quality. We manufacture

Heavy and Light Forgings, Driving and Car Axles,

Cranks, Pins, Piston Rods, &c.

Works at Lewistown, Pa.

Office, 220 S. 4th St., Philadelphia, Pa.

JOSEPH P. REED & CO.,

Iron Brokers and Commission Merchants,

261 S. Fourth St., Philadelphia.

Sole Agents for

COOPER IRON MINING CO., Chester, N. J.

RIDGEVIEW COAL AND COKE CO., Latrobe.

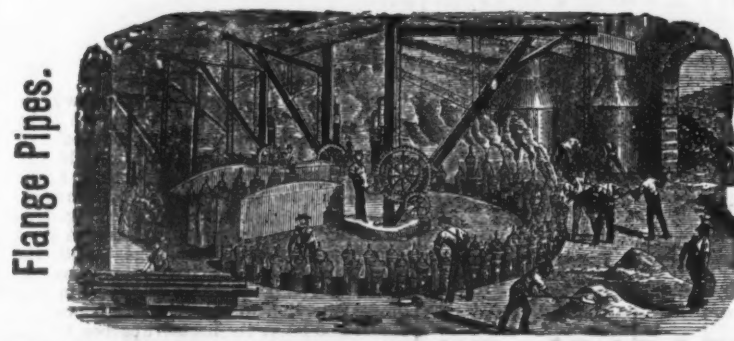
J. D. BOYLE'S CONNELLSVILLE COKE.

HARBISON & WALKER'S FIRE BRICKS.

MAGNETIC and HEMATITE IRON ORES a Specialty.

G. A. HEBERTON. S. FRANK SHARPLESS.

A. H. McNEAL, BURLINGTON, N. J.



CAST IRON PIPES FOR WATER AND GAS.

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., Limited, PITTSBURGH, PA.

MANUFACTURERS OF ALL KINDS OF
HAMMERED AND ROLLED

STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives,
Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Millst Web and Hand Saws, Shovels, Cotton Gin Saws,
Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement is unequalled for surface
finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.;
Cast and German Spring and Plow Steel."Iron Center" Cast Plow Steel. Finished Rolling Plow Counters with Patent Screw
"Soft Steel Center" Cast Plow Steel. Hubs attached.
"Solid Soft Center" Cast Plow Steel. Agricultural Steel cut to any pattern desired.
Steel Forgings made to order.Represented at 59 Beekman St., New York, and 417 Commerce St., Philadelphia, by
HOGAN & SON, General Agents for Eastern and New England States.

THE MIDVALE STEEL COMPANY, CRUCIBLE AND OPEN-HEARTH STEEL.

TIRES and AXLES OF EVERY DESCRIPTION.

Tool, Machinery and Spring Steel
Castings and Forgings.

Works and Office,

Ninetown, Philadelphia, Pa.

Warehouse,

12 N. 5th St., Philadelphia, Pa.

PHILADELPHIA STEEL FORCE.

TRADE

"Anvil" Brand Best Refined

TOOL CAST STEEL.

MARK.

Address all orders to

THE PHILADELPHIA STEEL FORCE, Office, Frankford, Philadelphia, Pa.

Agents:

HENRY G. NICHOLS, 14 Platt St., N. Y. City. THE SOUTHERN RAILWAY SUPPLY CO., 15 So. 14th St. Richmond, Va.
General Western Agents, CHAS. I. WICKERSHAM & CO., No. 232 Lake St., Chicago.

ESTABLISHED 1847.

A. WHITNEY & SONS, PHILADELPHIA.

CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Transports. Wheels furnished in rough
bored or on axles. Chilled castings made to order.

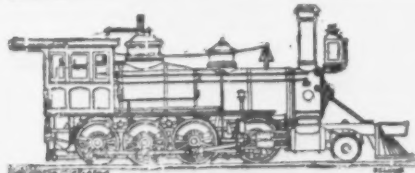
PENNSYLVANIA STEEL COMPANY, Steel Rails, Frogs, Crossings & Switches.

Forgings for Piston Rods, Guide Bars, Wrist Pins and Machinery Purposes.

Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

Address all orders to

PENNSYLVANIA STEEL COMPANY, 208 South Fourth Street, Philadelphia.



BALDWIN LOCOMOTIVE WORKS,

BURNHAM, PARRY, WILLIAMS & CO., Proprietors,
Philadelphia, Pa., U. S. A.

LOCOMOTIVE ENGINES of every Description.

Catalogues, photographs and estimates fur-
nished on application of customers.

NOISELESS STEAM MOTORS, For city and suburban Railways.

These machines are nearly noiseless in opera-
tion; show no smoke with the use of anthracite
coal or coke as fuel, and show no steam whatever
under ordinary conditions of service. They can
be run at two or three times the speed of horse-
cars, and draw additional cars. Circulars with full pa-
rticulars supplied.

ROANE IRON COMPANY,

Manufacturers of and Dealers in

Pig and Railroad Iron.

CHATTANOOGA, - - - - - TENN.

L. HERNSHEIM,

Manufacturers' Agent and Commission Merchant,

No. 20 NASSAU ST., NEW YORK.

STEEL RAILS, ENGLISH BESSEMER PIG IRON,
STEEL BLOOMS, FERROMANGANESE,
STEEL WIRE RODS, SPIEGEL IRON,
OLD & NEW IRON RAILS, AUSTRIAN CHARCOAL PIG IRON.

BRITTON IRON AND STEEL CO.,

MANUFACTURERS OF

IRON AND STEEL BOILER PLATE,

Tank, Bridge and Ship Plates,

BLACK AND GALVANIZED SHEET IRON.

Works foot of Wason St., cor. L. S. & M. S. R. R., CLEVELAND, O.

JACKSON IRON COMPANY,

Manufacturers of Fayette Pig Iron (L. S. Charcoal), Stewart Pig Iron (Bituminous Coal and Coke),
Also, Hammered Blooms, Billets and Muck Bar, extra low in phosphorus, for Siemens Martin and
Crucible Steel. Miners of Jackson (Lake Superior) Iron Ores.
FAYETTE BROWN, Gen. Agent. HARVEY H. BROWN, Asst. Gen. Agent. Offices, 130 Water St.

HARVEY H. BROWN & CO.,

AGENTS

CHAMPION IRON CO., } Lake Superior Iron Ores.
LAKE SUPERIOR IRON CO. }

Dealers in Pig Iron, Iron Ores and Old Rails.

Offices, 130 Water Street, - - - CLEVELAND, OHIO.

ORFORD NICKEL AND COPPER COMPANY, SMELTERS AND REFINERS OF COPPER.

THOS. J. POPE & BRO., Agents, 292 Pearl St., New York.

Copper Ore, Mattes or Bullion purchased. Advances made on consignments for refining and sale.
Smelting and Refining Works at Bergen Point, near New York. Offices, 292 Pearl St., New York.

CHARLES HUBBARD, 46 Cliff St., New York City HEAVY STEEL AND IRON FORGINGS,

For Marine and Stationary Engines.

Homogeneous Steel Boiler Plate, "Nashua" Brand.

Best YORKSHIRE BAR, "TAYLOR" IRON, for Stamped Work, Screws, etc., etc.

MUSKET SPECIAL TOOL STEEL, requires neither tempering nor hardening.
Estimates given.

ESTABLISHED 1861.

Jersey City Steel Works.

JAS. R. THOMPSON & CO.,

Manufacturers of all descriptions of

STEEL.

Warehouse, 93 John Street, New York.

THOS. C. BURROWS, AGENT.

IRON AND STEEL DROP FORGINGS

All shapes, small and large, including
Gun, Pistol, Wrench Bars, &c. Also, Die Sinking. Manufacturers also of
Bricklayers', Moulders', and Plasterers' Tools, Saddlers'
Round and Head Knives.

WILLIAM ROSE & BROS.,

36th & Filbert Sts., West Philadelphia.

HOOPES & MERRY, WEST SIDE GALVANIZING WORKS,

537 to 547 West 15th Street, New York,

Manufacturers of

The "Lion" and "Phoenix" Brands of Galvanized Sheet Iron.

Corrugated Iron for Roofing or Siding, Tin Plates, Solder, Slatting and Roofing Nails, Tinned, Gal-
vanized and Black. All kinds of Ironwork Galvanized or Tinned to order.

BIRMINGHAM ROLLING MILL CO.,

MANUFACTURERS OF

BAR, BAND AND HOOP IRON,

T-RAILS AND SPLICE BARS.

Also, Street and Tram Rails.

Birmingham, Alabama.

Head Office, Louisville, Ky.

We solicit inquiries for Bar Iron and small Rails. Orders filled promptly.

C. W. LEAVITT, 161 Broadway, New York, RAILS AND RAILWAY EQUIPMENT,

PIG AND BAR IRON, OLD RAILS AND SCRAP IRON.

GENERAL AGENT
ALLENTOWN ROLLING MILLS.AGENT FOR
PARDEE CAR AND MACHINE WORKS.

CALUMET IRON & STEEL CO.,

MANUFACTURERS OF

PIG IRON, MERCHANT BAR, IRON AND NAILS.

57 DEARBORN STREET, CHICAGO,

C. R. CUMMINGS, President.
D. C. BRADLEY, Vice Pres. and Gen'l Man.
CHARLES D. RHODES, Treasurer.
FRANCIS W. NEWLAND, Secretary.

Works, Irondale, Cook Co., Ill.

CHAS. G. LUNDELL,

No. 7 Exchange Place,

BOSTON,

Mass.

SWEDISH IRON

REPRESENTING
Ekman & Co.
GOTHENBURG,
SWEDEN.

WROUGHT IRON

Boiler Tubes,

Steam, Gas and Water Pipe.

Oil Well Tubing, Casing and

LINE PIPE.

Cotton Presses, Forgings,

ROLLING MILL AND

General Machinery.

READING IRON WORKS,

261 S. Fourth St. Philadelphia.

BROWN & BROTHERS,

81 Chambers St., N. Y. Waterbury, Conn.

MANUFACTURERS OF

BRASS, COPPER AND GERMAN SILVER,

In Sheets, Rolls, Rods, Wire, Tubing,
Rivets, and Bars, Etc.

ALSO,

Seamless Brass & Copper Tubing.

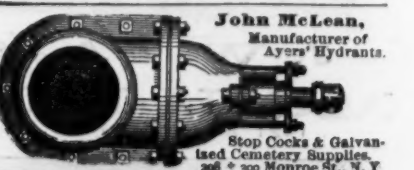
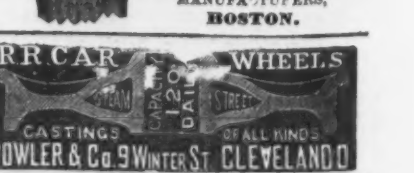
PATENTED SEAMLESS BRASS AND COPPER
HOUSE BOILERS, warranted to stand 300 lbs.
pressure and guaranteed against vacuum.PATENTED SPRING TEMPERED SHANK,
SILVER-PLATED, FLAT TABLE WARE, in rich
designs.

GERMAN SILVER SPOONS AND FORKS.

J. E. MERGOTT & CO.,

Manufacturers of

Lamp & Metal Goods

Brass Casting. | Spinning. | Estimates on Pat-
Brass Turning. | Stamping. | tented Articles.
40 & 42 Mechanic St., Newark, N. J.John McLean,
Manufacturer of
Ayers' Hydrants.Stop Cocks & Galvan-
ized Cemetery Supplies.
208 & 300 Monroe St., N. Y.OLD COLONY RIVET CO.
WINSTON, MASS.
TINNERS AND ALL OTHER
RIVETS
NORWAY IRON
1/16 IN. DIAM. & SMALLER.
ALL LENGTHS & STYLES.Sold by all
Hardware Dealers.THE
MALLEABLE
IRON
AXE WEDGE
PAT. MAR. 31, 1874.PORTER & WOOSTER
MANUFACTURERS,
BOSTON.WM. McFARLAND,
Iron and Brass Founder,
TRENTON, N. J.Chilled Cast Wire Dies a Specialty
Any size or style made at short notice.

RUMSEY & CO.,

Seneca Falls, N. Y., U. S. A.,

Manufacturers of

800 STYLES OF HAND AND POWER PUMPS,

FOR ALL PURPOSES AND USES.

**Also,
HAND FIRE
ENGINES.**

Illustrated catalogues furnished upon application.
Factories, **SENECA FALLS, N. Y.** Warehouse, 93 Liberty St., New York City. L. M. RUMSEY & CO., Agents, St. Louis, Mo. BRINTNALL, LAMB & CO., Agents, Chicago, Ill. MARCUS C. HAWLEY & CO., Agents, San Francisco, Cal. JUSTUS SCHMIDT, Agent, Hamburg, Germany.

SILVER & DEMING MFG CO.,

MANUFACTURERS OF

Cistern, Pitcher, Well

and Force Pumps,

Wind Mill Pumps,

HAND AND POWER

ROTARY PUMPS,

Hydraulic Rams,

BOILER FEED PUMPS,

Garden Engines, &c.

Also, Carriage Makers' Tools,

Blacksmiths' Drills, Butchers'

Tools, and Feed Cutters.

Write for Catalogue and Prices.

SILVER & DEMING MFG. CO.,

SALEM, OHIO, U. S. A.

H. WEINDEL,

405 North Fourth St., PHILADELPHIA,

Makes a Full Line of

HAND AIR PUMPS,

(Fly-wheels and Improved

Crank Motion.)

Also, manufacture of the easy

running Pendulum pumps for small

power.

THE

Gilbert & Bennett Mfg. Co.,

GEORGETOWN CONN.,

MANUFACTURERS OF

**IRON WIRE, SIEVES AND
WIRE CLOTH,**

Power Loom Painted Screen Wire Cloth,

GILBERT'S RIVAL ASH SIEVE

Galvanized Twist Wire Netting,

THE UNION METALLIC CLOTHES LINE WIRE.

Warehouse, - 42 Cliff St., New York.

John Maxheimer,

Manufacturer of

BRASS, BRIGHT**TINNED WIRE****& JAPANNED****Bird Cages.**

The cheapest and most

saleable in market.

Catalogues and Price

Lists furnished to the

Trade.

247 & 249 Pearl St.,

New York.

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages

Full size of Band for Brass and Tinned Wire Cages



The above cuts (Fig. 250) represent our **PATENT AQUAPULT**, so valuable a Hand Force Pump that certain competitors have made bold to infringe on same, and even to resort to the crime of plagiarism in using our cuts and trade-mark name of article to decoy customers away from our manufacture and invention; and we caution the trade and customers against purchasing this article when not made by ourselves, as we intend to protect our rights under our patent.

WE ARE THE ORIGINAL AND FIRST INVENTORS OF THIS STYLE OF PUMP, AND HOLD VALID LETTERS PATENT ON SAME, AND ANY STATEMENT THAT IT HAD BEEN IN THE MARKET PREVIOUS TO OUR MANUFACTURE OF SAME IS OF COURSE ABSURD AND WITHOUT THE SLIGHTEST FOUNDATION IN TRUTH.

W. & B. DOUGLAS, Middletown, Conn.

BRANCH WAREHOUSES:

85 and 87 JOHN STREET, NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

UNION MANUFACTURING CO.

Sole Manufacturers of

**SKINNER'S PATENT
COMBINATION CHUCK.**

Universal, Independent and Eccentric.

By sliding a stud on the back of chuck it is instantly changed from Universal to Independent, and vice versa. Each Chuck is guaranteed perfect. All parts are made interchangeable. Only the very best materials used in their construction. Reverse or special jaws furnished when desired.

We also manufacture

Plain and Ornamental Butts,
Single and Double Acting Spring Hinges,
Union Coil Door Springs,
Galvanized Pump Chain,
Patent Rubber Buckets,
Wooden Well Curbs, Wood Tubing,
Iron and Brass Pumps,
Patent Copper Pumps,
Hydraulic Rams, Power Pumps,
&c., &c., &c.

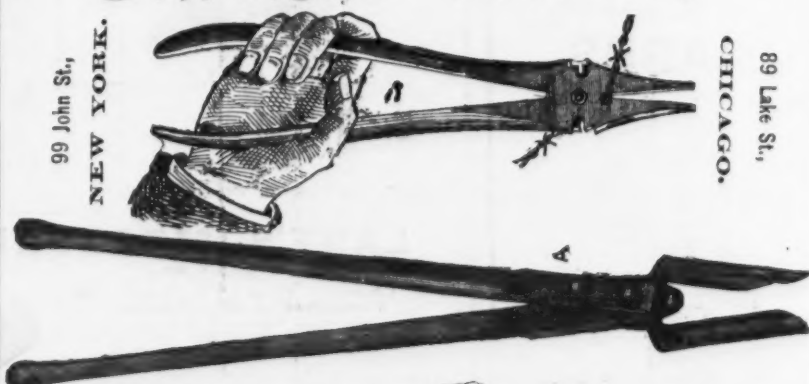
Write us for prices.

Union Manufacturing Co.,

Warehouse, 96 Chambers St., New York. NEW BRITAIN, CONN.

This Advertisement Changed Weekly.

John Barlow

99 John St.,
NEW YORK.89 Lake St.,
CHICAGO.

STAUFFER, MACREADY & CO., New Orleans, La. CARLIN & FULTON, Baltimore, Md.

GEORGE BROOKE, President.

GEO. W. HARRISON, Treasurer.

THE E. & G. BROOKE IRON CO.,

Birdsboro, Berks Co., Pa.,

Manufacturers of

**ANCHOR BRAND
NAILS AND SPIKES.**

Capacity 1000 Kegs per Day.

Made from their own Pig Iron, insuring regularity and superiority in quality.

Also, FOUNDRY AND FORGE

PIG IRON,

And Cold Blast Charcoal Car Wheel Iron.

NATIONAL HARDWARE & MALLEABLE IRON WORKS,

Lehigh Avenue, American and Third Streets, Philadelphia.

THOMAS DEVLIN & CO.,

MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS made from patterns to order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line of Carriage and Wagon Castings constantly on hand for the trade.

BRIDGEWATER IRON CO., Bridgewater, Mass.

Manufacturers of

SEAMLESS DRAWN BRASS & COPPER TUBES,

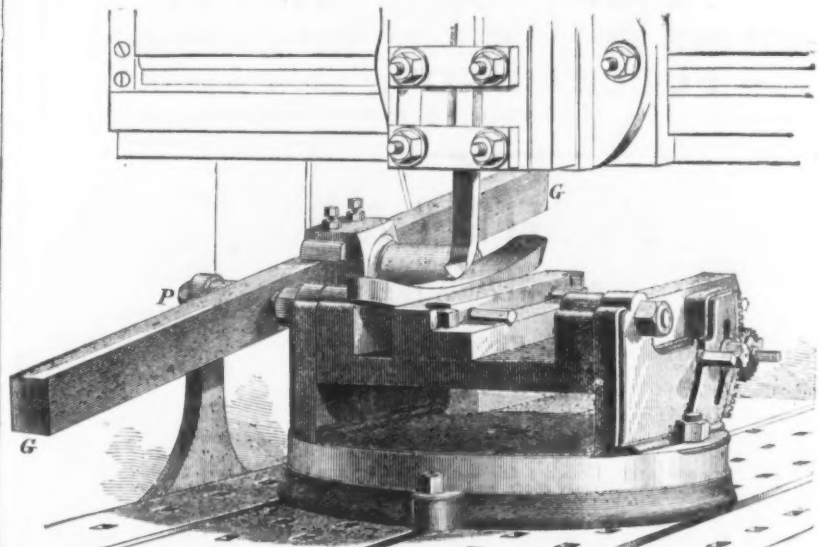
BRIDGEWATER HORSE NAILS, 3d. FINE NAILS,

Tack Plates and Forgings of Every Description.

NAHUM STETSON, Jr., Agent, 73 Pearl Street, New York.**Greenwood's Planer Chuck.**

This is a combination chuck, having all the ranges of usefulness of the ordinary planer chuck, and the special feature that it makes possible the planing of convex or con-

cave surfaces upon an ordinary planer, as will be understood from the following explanation of its construction, reference being had to the several illustrations, throughout which similar letters of reference refer to like parts. Piece A is pivoted to the base F, and may be secured in its adjusted position thereon by means of bolts in the annular T grooves I.



The Greenwood Planer Chuck.—Fig. 1.—The Chuck Set to Plane a Concave Surface.

in the other direction, its rear end approaching the planer table more nearly than the front end. To enable the chuck to be readily set to plane parallel surfaces, a pin T, Fig. 3, is provided, the piece B being secured to A by means of the screw N, Fig. 2. The rack and pinion and the index are provided to swing

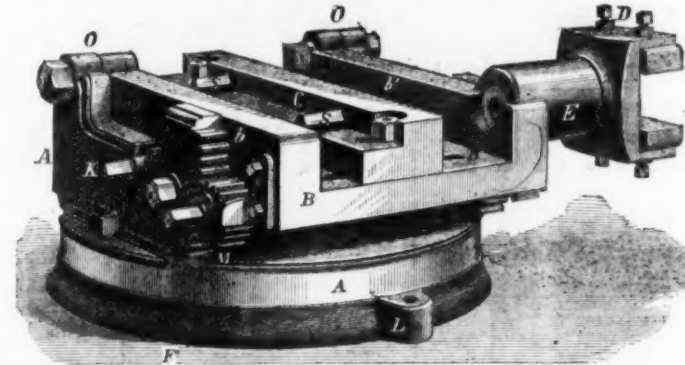


Fig. 2.—View showing the General Construction.

A carries the piece B, provided with the vise jaw C, the work being held between C and B' and secured by screws, S, the range of the jaw C being varied by the screw K to suit different widths of work. When B is secured at both ends to A, the three parts, A, B and F, therefore, constitute a swivel vise chuck with the usual range of capacity. To enable

that end of B (while pin T is removed), and to enable the accurate planing of tapers without requiring to move them in the vise to adjust the taper, which is another special and valuable feature of the chuck. Thus, suppose a piece of work to be set in the chuck, then one end of B being raised out of level, that end of the work will be planed thinnest,

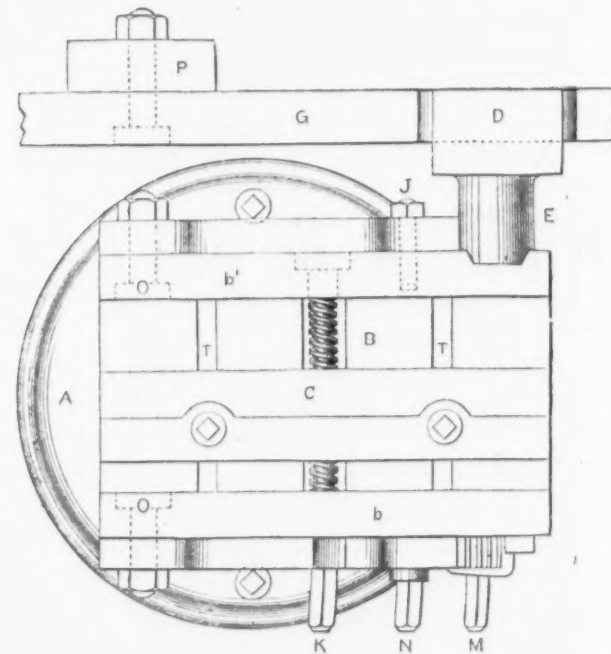


Fig. 3.—Top View of Chuck.

the planing of curved surfaces automatically, B is capable of being released at one end from A, and is at the other end pivoted at o o so that it will swing up and down upon the pivots o o as a center of motion. B provides, at E, journal bearing to a slide, D,

and the degree of taper can be adjusted by operating the pinion. Should a piece have two tapers they will be true one with the other, because both may be planed without moving the work after it is once chucked in the vise. Again, as the chuck is pivoted

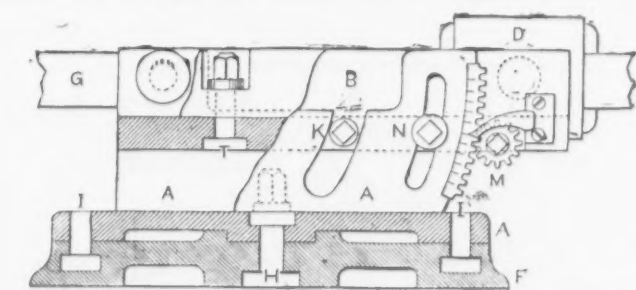


Fig. 4.—Vertical Section, showing the Vise Swiveling and Vise Adjustment Devices.

which operates upon a guide bar G, pivoted at P to a stand fixed at the side of the planer.

Now, suppose that the work, as one-half of a locomotive link, be chucked as in Fig. 1, and while the chuck is passing the cutting-tool, one end of B will be raised by reason of

upon its base, the vise may be swinging to any required position while set to plane either a parallel or a taper piece, giving the chuck a range of simple application and usefulness not possessed by any other work-holding appliance that we can call to mind. The tool, one end of B will be raised by reason of

L. B. Flanders Machine Works, No. 1025

AUBURN FILE WORKS,

Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
89 Chambers and 71 Reade Streets, N. Y.

Paris, 1878.


McCAFFREY & BRO.,

PENNSYLVANIA FILE WORKS

Philadelphia, Pa., U. S.

For Superiority.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.


THE QUEEN CARPET SWEEPER,
GRAHAM & HAINES.

SOLE AGENTS,

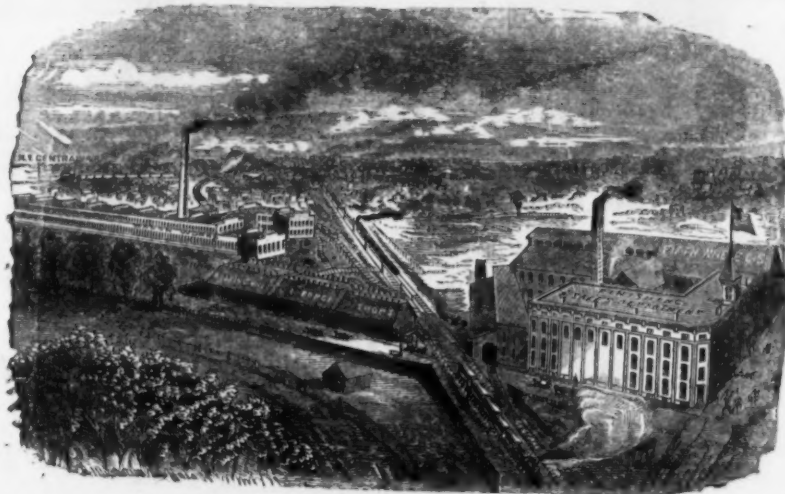
113 Chambers Street, - NEW YORK.

We offer this Sweeper with confidence, knowing it to be the best in the market.

PRICE, \$30 PER DOZEN.

Liberal discount to the trade. Send a sample order.

CARRIAGE HARDWARE.



Our new Illustrated Catalogue of 140 pages, and over 300 illustrations, will be mailed on application.

THE E. D. CLAPP MFG. CO., Auburn, N. Y.

ILLINOIS IRON & BOLT CO.,

CARPENTERSVILLE, KANE CO., ILL.,

MANUFACTURERS OF

THIMBLE SKEINS, JACK SCREWS, SAD
IRONS, COPYING PRESSES
and STANDS, &c.



BLACKSMITHS' DRILLS,

AND ALL KINDS OF BLACKSMITHS' TOOLS.

LIGGETT SPRING AND AXLE CO.,

LIMITED, MANUFACTURERS OF

SPRINGS AND AXLES

For Coaches, Phaetons, Buggies, Wagons, &c.

Pittsburgh, Pa.

TUFTING BUTTON

PATENTED June 28, 1881.

THE AMERICAN TACK CO., Fairhaven, Mass.,
Are making TUFTING BUTTONS with every Eye Soldered to its Back, giving them great Strength
and Durability. All Buttons are guaranteed satisfactory. Also Lining and Saddle Nails, and every
variety of

TACKS and NAILS.

New York Salesroom, - - - 116 Chambers Street.

Nicholson FILES.

Bandsaw Files,
Boot Heel,
Brass,
Cabinet,
Cant,
Cotter Taper,
Cotter Equaling,
Cross or Crossing,
Doctor,
Drill,
Feather Edge,
Finishing,
Flat
Flat Equaling,
Flat Wood,
Gang-Edger,
Ginsaw,
Gulleting,
Half-Round,
Half-Round Wood,
Hand,
Hand Equaling,
Handsaw Blunt,
Handsaw (Double-End),
Handsaw Taper, single cut,
Handsaw Taper, double cut,
Handsaw Taper, slim,
High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,
Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,
Reaper,
Roller,
Round,
Round Blunt,
Slotting,
Slim Handsaw Taper,
Square,
Square Blunt,
Square Equaling Files,
Stave Saw,
Three-Square Files,
Three-Square Blunt Files,
Tumbler Files,
Union Cut,
Warding Files,
Warding Blunt File,
Warding Round Edge File.

RASPS.

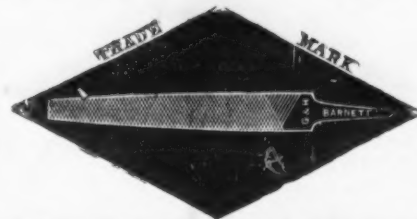
Baker's,
Beveled Edge,
Bread,
Cabinet,
File, Flat and Half Round,
Flat Shoe,
Flat Wood,
Half-Round Shoe,
Half-Round Wood,
Horse, Plain and Tanged,
Horse Mouth,
Jig,
Oval or French Shoe,
Racer, Plain and Tanged.

SPECIALTIES.

Butchers' Steels, Improved,
Bent Riffles, Handled,
File Cards,
File Brushes,
Machinists' Scrapers,
Stub Files & Holder, Detach-
able,
Surface File Holder,
Vise File Holder.

**NICHOLSON
FILE CO.,**
PROVIDENCE,
R. I.,
SOLE MANUFACTURERS.

Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for
"VERY SUPERIOR GOODS."

G. & H. BARNETT,

39, 41 & 43 Richmond St., Philadelphia.

CHARLES B. PAUL,

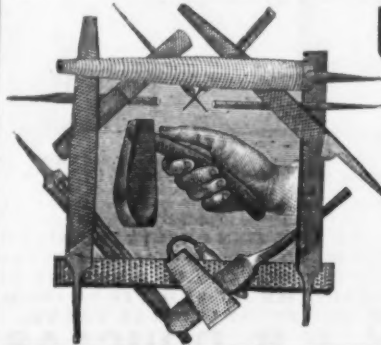
Manufacturer of HAND CUT FILES.

Warranted CAST STEEL.

187 Tenth Street, Williamsburgh, New York.

All descriptions of Files made to order. Price List mailed on application.

Established 1863.



UNION FILE WORKS,

311 to 315 North St.,

BALTIMORE, MD.,

Manufacturers of

FILES AND RASPS

Made from the Best Refined Cast Steel.
With all the requisite facilities to produce a
first-class article, we are enabled to offer Files
that will give entire satisfaction.

MORITZ & KEIDEL, Agents,
48 & 50 German St., Baltimore, Md.

ESTABLISHED 1842.

INCORPORATED 1881.



CHAS. F. CRIPPS, President.

GILBERT PARKER, Treas. and Gen. Agent.

THE J. BARTON SMITH CO.,

Manufacturers of the Celebrated

J. B. SMITH'S FILES, RASPS, WOOD SAWS, &c.,

Fourth and Somerset Streets, PHILADELPHIA.

New York Branch, 128 Chambers Street.

WM. H. BRAMHALL, Manager.

Prices the lowest. Goods the best.

Send for sample order.

DODGE & BLAKE.

DODGE'S PATENT

FILE FORGING AND FILE GRINDING.

These machines have long been in use in this country and in Europe, and are unexcelled for perfec-
tion of work and labor saving. We now offer them with the latest improvements, and will apply them
to forging and grinding other articles of tapering or otherwise irregular form.

Works at Woodside, NEWARK, N. J.

THRIFT FILE WORKS,

Manufacturers of all kinds of
Files, Rasps.



CHRISTIAN HENSSELER,
428, 430, 432 & 434 Ireland St.,
PHILADELPHIA, PA.

FILES

JOHNSON & BRO.

No. 1 Commercial Street, Newark, N. J.

FILES! FILES!

FILES

NORTHWESTERN FILE WORKS,

65, 67 and 69 So. Canal St., Chicago,

Make a specialty of 12 and 14-inch Flat. Will be
pleased to hear from parties using the above sizes
largely.

STOVE REPAIRS.

Repairs for Stoves made at Troy, Albany, Ro-
chester, Cleveland, Buffalo, Boston, St. Louis,
Quincy, Chicago, Milwaukee and elsewhere, at
W. C. METZNER,
127 W. Randolph St., Chicago, Ill.

LANE'S MEASURING FAUCET.

Price, \$3.00.

For Light or Heavy Molasses, Oils,

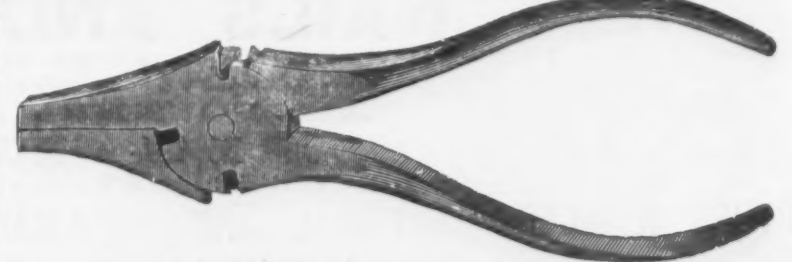
Varnishes or other Fluids.

We warrant these Faucets to be as repre-
sented, measuring correctly and working
more easily in heavy molasses than any meas-
uring Faucet in the market. No grocer can
afford to be without them, for they save time,
and "time is money." They insure perfect
cleanliness, requiring no life measures or fuel
to collect dirt and draw files. They do not
drip. They prevent all waste, as no molasses
or other fluid can pass except when the crank
is turned. They are the embodiment of sim-
plicity, and consequently they are always in
order. They work easily in the heaviest mol-
asses. They are warranted to measure cor-
rectly, according to U. S. Standard.

MANUFACTURED EXCLUSIVELY BY

LANE BROS., Millbrook, N. Y.

General Agency, GRAHAM & HAINES, 113 Chambers St., New York.



J. M. KING & CO.

WATERFORD, N. Y.,

Manufacturers of the BUTTONS PATENT

"WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of

Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps,
Hand, Nut and Screw Taps, Pipe Taps and Reamers.

Price List on application.

Established by DANIEL B. KING, 1859.

A. FIELD & SONS,

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

WIRE NAILS,

TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

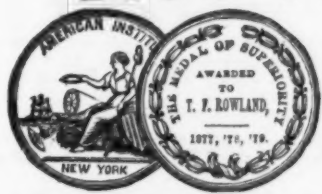
Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

DUK'S PREMIUM ELEVATOR BUCKET.



ALWAYS FIRST
COMPETITIVE



PREMIUM IN
TESTS.

Warehouse Bucket, in sizes from 12 to 17 inches.

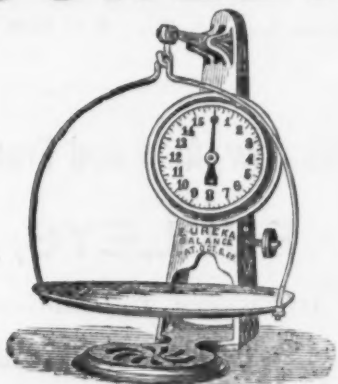
The Mill Bucket, in sizes from 3 1/4 to 16 inches.

This Bucket is struck out from the best charcoal iron; consequently it is very durable. It requires 50 per cent. less power to run it than the old-fashioned square bucket, and will outwear half a dozen of them. Over 30,000 are now in use by the principal Millers, Brewers, Distillers and Manufacturers at home and abroad. It is the best Bucket made.

CAUTION.—The popularity of the DUK BUCKET has caused many manufacturers of the old style of Elevator Bucket to closely imitate its spherical shape. We warn all parties against patronizing infringers of our patents, as they will be held accountable. Send for circular. Address

T. F. ROWLAND, Sole Manufacturer, Continental Works, BROOKLYN, N. Y.

Eureka Self-Adjusting SCALES.



Have a patented attachment for ascertaining the tare of a dish or other receptacle used in weighing without the use of weights or loss of time.

Manufactured only by

John Chatillon & Sons,

91 and 93 CLIFF ST., N. Y.

Send for Illustrated Price List.

MEDFORD FANCY GOODS CO.,

98 Duane Street, New York.



MANUFACTURERS OF
Dog Collars, Locks, Leads
AND BELLS.

The largest variety in the world. Send for Illustrated Catalogue.

ESTERBROOK'S STANDARD and RELIABLE STEEL PENS

FOR SALE

BY ALL STATIONERS.



ESTERBROOK STEEL PEN CO.

Works, Camden, N. J.

at John St., New York

GRAY IRON CASTINGS.

JOHN KEPPELMAN, Reading, Pa.,
Hereby gives notice that he has opened a Jobbing Foundry, and is ready to receive orders for all kinds of Light Gray Iron Castings; also, for every description of Machinery. Orders promptly filled. Please address
JOHN KEPPELMAN, Cor. 3d and Court Sts., Reading, Pa.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the improved

Hydraulic Jacks

AND
Punches.

Roller Tube Expanders and Direct Acting Steam Hammers.

Communications by letter will receive prompt attention.

Jacks for pressing on Car Wheels or Crank Pins made to order

THE ANSONIA CORRUGATED STOVE PLATFORM.

With Patented O. G. Border.

ROUND, SQUARE AND OB-
LONG, IN ALL SIZES.

Manufactured of heavy metal, requiring no nailing or lining, the edge retaining its form. Superior pattern, finish and quality. Price as low as any.

Send for List and Discount.

Packed 12 in each case.

Out Showing Round Platform.

ANSONIA BRASS AND COPPER CO.

MANUFACTURERS OF

PURE ELECTRIC WIRE.

For Magnets, Telegraphs, Telephones, &c.

Insulated on the bare wire with H. Splittorf's patented Liquid Insulation, covered with cotton or silk.

All sizes of Bare and Covered Wire in Stock.

The conductivity of every bundle tested and warranted.

THE ANSONIA WROUGHT GONGS,

For Clocks, Indicators, Telephones, Call Bells, Bell Punches, Steamboat and Railroad Use. Burnished or Nickel Plated.

ANSONIA BRASS AND COPPER CO., 19 Cliff St., New York.

THE ESSEX HORSE NAIL CO., Limited.

THE ESSEX HORSE NAILS

Are drawn from the Best Norway Iron Rods only. They are hot forged and cold-pointed, rendering them both tough and stiff, and are warranted

FIRST-CLASS IN EVERY RESPECT.

By the use of improved machines we forge Fifty per cent. More Nails on a machine than any other company, and are thus enabled to sell them proportionately less than any other nail of equal quality. All nails branded ESSEX fully guaranteed.

GENERAL AGENTS:

HOWE & CO., Troy, N. Y.

FOUNDRYMEN, ATTENTION.

FOR POWER MOLDING MACHINES

SEND FOR DESCRIPTIVE CIRCULAR TO

AIKIN & DRUMMOND, Patentees, Louisville, Ky.

Hamilton street, Philadelphia, have recently undertaken the manufacture of this article and are now putting it upon the market.

Materials for Telegraph and Telephone Wires.

Recent developments in electrical science lend considerable interest to the following remarks recently received from Messrs. Felten & Guillaume, of Mulheim, Germany, the well-known telegraph engineers and manufacturers of wire, wire rope and telegraph cables.

The stipulations as to the conductivity of telegraph wires, until quite recently made only by English telegraph engineers, have now been introduced in the specifications of other telegraph administrations, and all telegraph wire manufacturers are now required to test their wire as to its conductivity. A great number of experiments have been made with different materials for such wires, and a number of results so obtained are contained in Table I embodied in this article,

breaking strain, its conductivity, on the other hand, being slightly less than that of iron wire.

German Charcoal Iron Wire.—This wire occupies a position between puddled iron wire and Swedish steel wire, so far as conductivity is concerned. It is suitable for conducting purposes only if quite soft, and has then a breaking strain equal to that of puddled iron wire. As regards elasticity, it occupies a similar position to soft iron and steel. The nominal price of German charcoal iron wire 4 mm. thick may be accepted as 30 marks per 100 kg., the price, therefore, being greater by about 20 per cent. than that of puddled iron of a similar size. Taking into account the superior conductivity of this quality of metal, a wire 3.7 mm. thick will not offer a higher resistance than a puddled iron wire 4 mm. thick, weighing at the same time only about 84 kg. per km. and costing 26.46 marks per km. The cost would, therefore, not greatly exceed that of puddled iron wire of equal conductivity, the difference amounting to about 6 per cent. The greater outlay would, therefore, as in the

TABLE I.—RESULTS OF TESTS MADE WITH TELEGRAPH AND TELEPHONE WIRES.

Name of materials.	Breaking strain per sq. mm. in kg.				Resistance of 1 km. of wire at 15° C.				Proportions of conductivity as compared with that of pure copper.
	4 mm.—Kg.	2.5 mm.—Kg.	2.0 mm.—Kg.	1.25 mm.—Kg.	4 mm.—S. U.	2.5 mm.—S. U.	2 mm.—S. U.	1.25 mm.—S. U.	
Copper wire.....	38	352	137	88	34	1.5	3.7	5.8	100
Phosphor-bronze wire.....	55	590	270	173	57	6.5	16.8	26.8	8.9
Galvanized Swedish soft.....	36	452	176	113	44	8.7	22.4	34.9	16.5
Galvanized charcoal iron wire.....	30	628	245	157	61	9.0	23.1	36	16
Galvanized Bessemer steel wire.....	40	502	196	126	49	9.0	23.1	36	16
Galvanized German soft.....	40	502	196	126	49	10.3	26.4	41.1	14
Galvanized charcoal iron wire.....	40	502	196	126	49	10.3	26.4	41.1	14
Galvanized Bessemer steel wire.....	40	502	196	126	49	10.3	26.4	41.1	14
Galvanized Siemens soft.....	48	528	206	132	51	10.8	27.7	43.3	13.3
Martin ingot iron wire.....	65	816	319	204	79	12	30.5	48	12.5
Galvanized puddled iron wire.....	40	502	196	126	49	13.7	35.2	54.9	10.5
Galvanized patent cast steel wire.....	95	1193	466	298	116	15.2	39.0	60.6	9.5
Hard.....	140	1758	686	440	171				

and which will be found interesting in many respects. The results obtained give rise to the following reflections:

Copper.—The use of copper for conducting wires was discontinued as soon as the application of the telegraph began to assume larger proportions. Notwithstanding the high conductivity of the metal, it appears to be the least suitable material for telegraph lines of any considerable importance, on account of its low breaking strain and elasticity, its high price, moreover, making its adoption an item of considerable expense. Copper has been embodied in these experiments, since it may serve as a basis for drawing a comparison between the qualities of other materials.

Puddled Iron (Best, Best).—Iron has undoubtedly been most extensively applied for conducting purposes, puddled iron in particular being favorably received on account of its cheapness and ample conducting power. The wire was formerly protected from corrosion by dipping it in boiled linseed oil, but of late the galvanizing process, though more expensive, has proved more efficient. The tests made with this material proved that a wire, in order to have a conductivity equal to that of copper wire, must have a sectional area eight and three-quarter times as great. The specific gravity of iron as compared with that of copper is as 6 : 7, and a wire of puddled iron will, therefore, weigh seven and one-seventh times as much as copper wire of equal conductivity. The strain brought to bear on the supports would therefore be correspondingly increased, but on account of its higher breaking strain being to that of copper as 40 : 23, it is possible to have the supports at longer distances apart. As far as the cost is concerned, the value of the galvanized puddled iron wire 4 mm. in diameter, may be taken as 25 marks for 100 kg. The resistance of this wire has been found to be 12 Siemens units per km., being equal to the resistance of a copper wire 1/4 mm. in diameter. A kilometer of galvanized puddled iron wire, 4 mm. thick, weighs about 100 kg., and costs 25 marks, and as a kilometer of copper wire 1.4 mm. thick weighs 14 kg., and costs on an average 190 marks per 100 kg., or 26.4 marks per km., the difference in price would not be great for equal conductivities.

Swedish Charcoal Iron Wire.—Among the different kinds of iron and steel wire, charcoal iron wire possesses the highest conductivity, being about 16 1/2 per cent. of that of copper wire. The weight of the wire of this material, as compared with copper, would be in the proportion of 8 : 11, and in cases where a puddled iron wire of 4 mm. would be required, weighing about 100 kg. per km., a Swedish charcoal iron wire of 3.4 mm. weighing 70 kg. per km., would be sufficient so far as conductivity is concerned. By adopting this material, the strain on the points of support is considerably reduced. If the Swedish wire is of the same size as the puddled wire usually employed, a greater rapidity of transmission is the result. On account of its lower breaking strain, however, the points of support must be at shorter intervals. The Swedish material is, of course, considerably higher in price, a wire 6 mm. thick costing 45 marks per 100 kg., this being about 20 marks higher than the price of puddled iron wire. Taking into consideration the higher conductivity, a wire of 3.4 mm., costing about 32 marks per km., could do the same service as a puddled iron wire of 4 mm., costing only 25 marks per km. Swedish iron wire would therefore be dearer than puddled iron wire by about 31.6 per cent., and should be chosen only in such cases where the greater rapidity of transmission attainable would justify the greater expense of construction.

Swedish Bessemer Steel Wire.—Swedish steel wire has about the same conductivity as Swedish iron wire, and possesses about the same breaking strain as puddled iron wire, namely, 40 kg. per square mm. of sectional area. With regard to elasticity, the Swedish steel and iron wires are not different from soft puddled iron wire, the changes of temperature having the same elongating effect on either. There is no difference in price between Swedish steel and iron wire, the only advantage of the steel being its higher

case of Swedish material, be justifiable by the necessity of the greater rapidity of transmission or of a lighter construction.

German Ingot Iron.—German ingot iron, the conductivity of which is rather more than 10 per cent. greater than that of puddled iron wire, is very suitable for telegraph purposes, and has also been extensively used in connection with telephones. The softer kind of ingot iron wire has a breaking strain 5 per cent. higher than that of soft iron wire, whereas the harder kind has a breaking strength of from 60 to 65 kg. per square mm., and is very desirable for conducting purposes on account of its tenacity and ductility. A galvanized ingot iron wire 4 mm. thick costs about 35 marks per 100 kg., or about 40 per cent. more than puddled iron wire. For equal weights, however, the rapidity of transmission is greater by about 10 per cent., and since the breaking strain is greater by more than one-half, the supports may be placed at greater distances apart, and the higher price is in many cases more than balanced by the cheapness of construction of the line.

Patent Cast Steel Wire.—Cast steel wire is used for telegraph lines only where long spans are absolutely necessary and unavoidable. Its conductivity is only from 9 1/2 to 10 1/2 per cent. of that of copper. Its high breaking strain, however, permits a sectional area of about one-third of that of iron wire so as to obtain an equal breaking strength, and by the consequent reduction of weight the increased cost is balanced, if, indeed, not outweighed. The strength of puddled iron wire 4 mm. thick is not greater than that of cast-steel wire 2.2 mm. thick, the former, moreover, weighing 100 kg. per km., and costing 25 marks, while the latter weighs only 30 kg. and costs 20.1 marks. The iron wire opposes a resistance of 12 S. U., and the latter of 73.32 S. U. In order to reduce the resistance of the latter to that of the former the thickness of the steel wire would have to be 4.5 mm., weighing 125 kg. per km., and costing 78.75 marks, this being more than three times the price of puddled iron wire of equal conductivity.

Phosphor Bronze.—Owing to the rapid development of the telephone and to the special requirements imposed upon wire for telephonic connections, phosphor bronze has been put forward by many as being the most excellent material for such purposes. Its application has been attempted on several occasions, and it will therefore be interesting in this connection to compare it with other materials. Trials made with phosphor-bronze wire manufactured by different makers, showed that the breaking strain and conductivity were also in an inverse proportion; that is to say, the resistance increases with the breaking strain. The most favorable result obtained as to conductivity is given in Table I, and shows that the material has a conductivity equal to 22 per cent. of that of copper, and a breaking strain of 55 kg. per sq. mm. The highest breaking strain observed was 110 kg. per sq. mm., but on measuring the conductivity of the samples giving this result, it was found to be only 8 per cent. of that of copper, the wire, moreover, being much too brittle for the purpose intended. The cost of the wire may be assumed at 320 marks per 100 kg., or about 50 per cent. more than the price of copper wire. Phosphor-bronze wire having about double the breaking strain of copper wire would cost about 25 per cent. less than the latter, the length and breaking strain being identical. The conductivity of the wire with the same breaking strain and half the section and weight would, however, be only 11 per cent. of that of copper wire. Comparing it with galvanized puddled iron wire, phosphor-bronze wire 3 mm. thick would have about the same resistance as galvanized puddled iron wire 4 mm. thick, and would weigh 63 kg. as against 100 kg., the price being 201.6 marks as against 25 marks per km., or about eight times as much. Besides this disadvantage, phosphor-bronze wire is too costly to justify its use unless required by special circumstances. The advantage claimed for it of being able to withstand the corrosive influence of external agents, is also true for galvanized wire, and the former, therefore,

Cutlery.

THE
LAMSON & GOODNOW MFG. CO..

Salesroom and Warehouse, 38 Chambers Street, New York City. Factories, Shelburne Falls, Mass.

Superior Cutlery of all kinds and grades, from the finest in pearl and ivory handles to the lowest price in wood and iron handles.

OUR
BUTCHERS' and HUNTERS' KNIVES

Are warranted to be equal in style, finish and quality, to any goods made in the world.

"COMPARE, THEN JUDGE."

We are the sole owners of the *Gardner Patent Guard and Rest for Carving Forks*, and the manufacture of fine carvers with a specialty.

JOHN WILSON'S CELEBRATED

NO ARTICLE MARKED "WILSON" IS GENUINE, UNLESS IT ALSO BEARS THE

TRADE MARK



"FOUR PEPPER CORNS AND A DIAMOND," GRANTED A.D. 1766 BY THE CORPORATION OF CUTLERS OF SHEFFIELD, AND PROTECTED BY ACT OF PARLIAMENT.

REGISTERED ALSO AT WASHINGTON, U.S. ACCORDING TO ACT OF CONGRESS.

ALSO AT LEIPZIG, IN ACCORDANCE WITH THE GERMAN TRADE MARKS' REGISTRATION ACT.

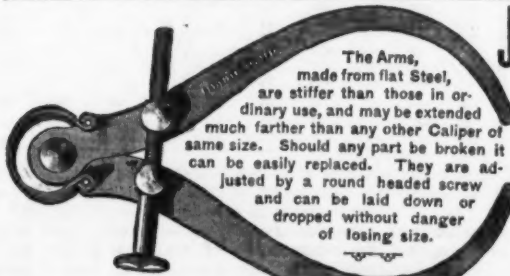
WORKS:--SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

BUTCHERS' KNIVES,
BUTCHERS' STEELS,
AND
SHOE KNIVES.

INFRINGEMENT.—SPECIAL NOTICE.

It having come to the knowledge of JOHN WILSON that counterfeit Butchers' Knives, purporting to be of his manufacture, are being sold in the United States, he hereby cautions all purchasers of his Knives and Steels to be on the alert against such impositions.

JOHN WILSON also hereby gives NOTICE, that it is his determination to institute Legal Proceedings against any person or persons who may be detected infringing his Trade Mark, and with that view he will handsomely reward anyone supplying such evidence as will lead to the conviction of the Makers and Vendors of the said Spurious Imitations.



3 inch.....\$11.50. 5 inch.....\$15.00. 7 inch.....\$20.00 Per Dozen.
DISCOUNT TO THE TRADE.

J.R. Torrey Razor Co

WORCESTER, MASS.

MANUFACTURERS OF

AMERICAN RAZORS

Sole Agents for

WRIGHT'S PATENT

CALIPER.



WM. M. CORNWALL,

18 Warren St., New York City,

JOBBER IN

BREECH AND MUZZLE-LOADING

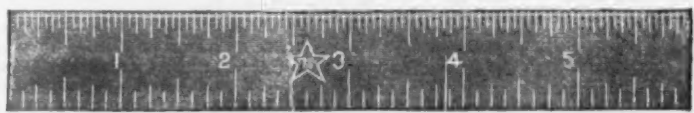
SHOT GUNS,

RIFLES, REVOLVERS,

AMMUNITION, FISHING TACKLE,

Pocket Cutlery and Sporting Goods Generally.

Goods sold to The Trade Only. Send for Price Lists.



STAR TOOL CO.

FLEXIBLE STEEL RULES and CENTER GAUGES Made of Best Quality Tempered Steel. These Rules and Gauges are guaranteed of correct measurement, graduating $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, 1-32 and 1-64 inch. Price Lists upon application.

McCOY & SANDERS, Sole Agents,
43 Chambers St., New York.

Stanley Rule & Level Co.,

MANUFACTURERS OF

Improved
Carpenters'
Tools.



FACTORIES

New Britain, Conn.

WAREHOUSES,

29 Chambers St.,

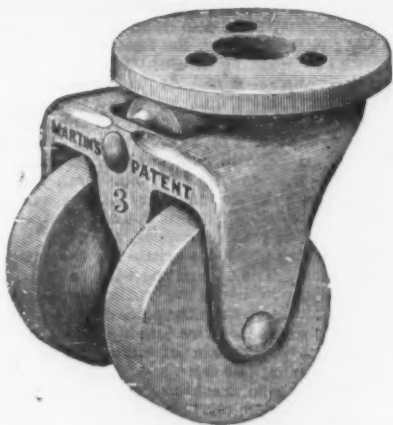
New York.

Manufacturers of Bailey's Patent Adjustable Planes.
General Agents for the sale of Leonard Bailey & Co.'s "Victor Planes."
Manufacturers of "Defiance" Patent Adjustable Planes.

Office of

PHOENIX CASTER CO.,

Indianapolis, Ind.



Hibbard, Spencer & Co., Chicago, have sold our Casters as follows:

1879.....\$322.60

1880.....590.92

1881.....1371.26

Melson, Matter & Co., Grand Rapids,

Mich.:

1879.....\$64.60

1880.....240.00

1881.....574.51

We have just issued a new Catalogue, which we would be pleased to mail with terms upon application.

PHOENIX CASTER CO.,

Manufacturers,

INDIANAPOLIS, IND.



Our Drawer is so uniform, simple, gives all competitors from the best.



WROUGHT IRON

ADJUSTABLE

"Forty Daisy Trucks in use. Just what we want."

WASHINGTON STAMPING CO.,

Washington, Ohio.

TUCKER & DORSEY,

MANUFACTURERS,

INDIANAPOLIS, IND.

Cutlery.

CORPORATE MARK



Joseph Rodgers & Sons

(LIMITED)

CELEBRATED CUTLERY.

No. 82 Chambers Street, New York.

F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons' precautions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark

ESTABLISHED 1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK,

SOLE AGENTS FOR

Ely Bros., Caps, Wads, &c.,

Joseph Elliot & Sons, Razors,

Isaac Greaves, Sheep Shears, &c.,

Robert Sorby & Sons, Sheep Shears, &c.,

Edward Elwell, Hoes, &c.,

R. & J. Linacre, Grass Hooks and Sickles,

Webster & Horsfall, Steel Wire,

GENERAL AGENTS,

Western File Co.'s American Files.

HEADQUARTERS FOR

ANVILS, CHAIN, CUTLERY, GUNS,

&c., &c., &c.



Silver Medal, 1875-Paris.

JOHN SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c.,

of every description.

CORPORATE MARK.

SPENCER

SHEFFIELD

Granted 1749.

FURNESS, BANNISTER & CO.,

NEWARK, N. J.

Manufacturers of

TABLE CUTLERY.

PRICES FURNISHED ON APPLICATION.

STAR LOCK WORKS.

ESTABLISHED 1836.

Trunk Locks,

Door Springs,

Pad Locks,

Trunk Stays,

Dead Latches,

Keys, &c., &c.

110 South 5th St., and Sansom, bet. 5th

and 9th, PHILADELPHIA.

PATENTED

Scand. Pad Locks.

With Flat Keys.

Shackle secured to the Lock Box.

HILLEBRAND & WOLF.

GEO. H. CREED,

SHIP CHANDLERY,

103 Reade Street, New York.

Manufacturers of and Wholesale Dealers in

Cotton and "Long Flax" Sail Duck,

Cotton and Linen Ravens,

Creed's Patent Ships' Clews, Heltman's Wire Rope

Splicers. Agent for Raymond's American Crane Oil

for lubricating Cylinders and Valves.

SPENCER & UNDERHILL,

94 Chambers Street, NEW YORK,

AGENTS FOR

American Screw Co.'s Wood Machine and Rail Screws, Stove and Tire Bolts,

Rivets, &c.

G. F. Warner & Co.'s Carriage Clamps.

DEPOT FOR

O. Ames & Son's Shovels, Spades and Scoops.

A. Field & Son's Tacks, Brads, Nails, &c.

Nicholson File Co.'s Files and Rasps.

W. & S. Butcher's Chisels, Gouges, Plane Irons and Cleavers.

E. W. Gilmore & Co.'s Strap and T Hinges.

Russell Jennings' Auger and Dowel Bits.

Richardson Bros' Saws.

Warner & Noble's Hammers.

ALSO A GENERAL ASSORTMENT OF HARDWARE.

Cutlery.

ROBERT SORBY & SONS,

SHEFFIELD,

MANUFACTURERS OF THE CELEBRATED

Kangaroo Sheep Shears.

The best

Shears

made.

Every

Shears

Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., NEW YORK,

SOLE AGENTS.

Send for price list and terms.

ESTABLISHED 1853.

E. E. EATON,

GUNS,

AMMUNITION,

Fishing Tackle,

CUTLERY,

53 State St. Chicago.

KEYSTONE RIVETING FORGE.

An Improved Pattern.

Cheap and Durable.

BEST IN THE MARKET.

Send for catalogue to

KEYSTONE PORTABLE FORGE CO.,

204 North 4th St., Philadelphia, Pa.

NEW MAKE OF MINE LAMP.

THREE DIFFERENT SIZES.

SEAMLESS BRASS COLLAR,

BRASS HINGE,

Solid Lid.

NO SOLDERING THE HINGE CAN NOT MELT OFF.

LEONARD BROS., Scranton, Pa.

A. F. PIKE.

Pike Station, New Hampshire,

Manufacturer and Wholesale Dealer in

Bluestone

For Scythes, Axes, Knives and Turpentine Hacks.

Factories at Pike Station, N. H.,

and Evansville and Westmore, Vt.

Genuine Old Reliable,

Indian Feed Red End,

Premium Union,

White Mountain,

Patent Hopper,

Diamond Grit,

The New Boss,

Leamster, Egg,

Willoughby Lake,

Green Mountain,

Black Diamond,

Mowing Machine,

German Pattern,

Chocolate, &c. &c.

Stones made, labeled and branded in any style desired. PRICE and QUALITY GUARANTEED. All the above brands are of clear, keen grit and will not glaze.

B. F. Mercer,

Manufacturer of

Wood Pumps

Plain and

Porcelain Lined,

STOCK WELLS,

HOUSE WELLS

& CISTERNS.

Send for Price List.

B. F. Mercer,

Alliance, O.

MANUFACTURER OF

WOOD PUMPS

Plain and

Porcelain Lined,

STOCK WELLS,

HOUSE WELLS

& CISTERNS.

Send for Price List.

B. F. Mercer,

Alliance, O.

MANUFACTURER OF

WOOD PUMPS

Plain and

Porcelain Lined,

STOCK WELLS,

HOUSE WELLS

& CISTERNS.

Send for Price List.

B. F. Mercer,

Alliance, O.

MANUFACTURER OF

WOOD PUMPS

Plain and

Porcelain Lined,

STOCK WELLS,

HOUSE WELLS

& CISTERNS.

Send for Price List.

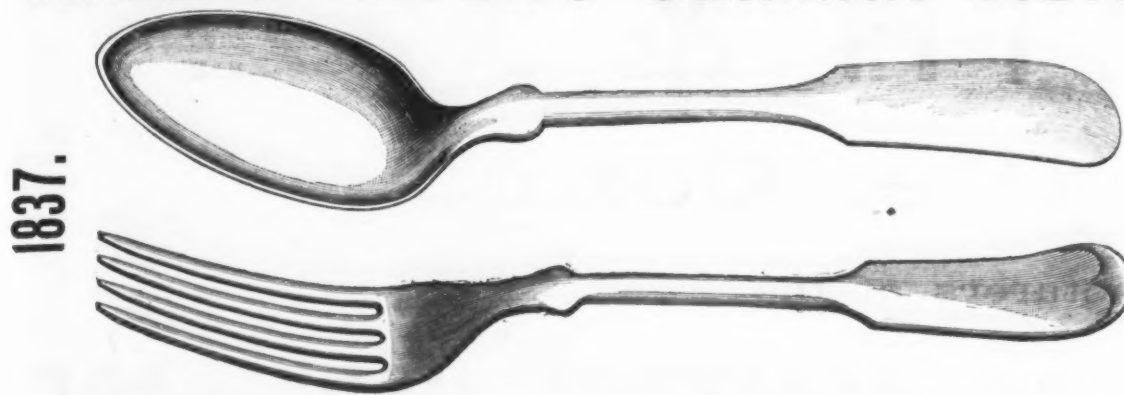
B. F. Mercer,

Alliance, O.

A. G. COES
PAT. DEC. 26, 1871.

Established in 1839.

HALL & ELTON'S GERMAN SILVER.



In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO., Wallingford, Conn., and 75 Chambers St., New York.

HOLMES, BOOTH & HAYDENS,

MANUFACTURERS OF

Finest Quality Silver-Plated Spoons, Forks, Knives, &c.

"JAPANESE
PATENTED."



"JAPANESE
PATENTED."

NOTICE.—We guarantee the base of our Spoons, Forks, &c., to be full 12 per cent. Nickel Silver, and extra heavily plated with pure Silver. Our goods are all hand burnished, and are first-class in every respect. We pack our Spoons and Forks one dozen in each box.

49 CHAMBERS ST.,
NEW YORK.

Factories,
WATERBURY, CONN.

18 FEDERAL ST.,
BOSTON.

T. C. CONWAY, 88 Chambers Street, New York,

Manufacturers' Agent for

REVOLVERS, BREECH-LOADING GUNS, TABLE CUTLERY, CAST-IRON, NICKEL-PLATED AND STEEL SHEARS.

The Greenfield Co.-Op. Mfg. Co. Table Cutlery.
The Hartford Crystal Cutlery Co., Patent Table Ware.
The Norfolk Shear Co., Cast-Steel Shears, Scissors and Trimmers.
The Atlas Works, Japanned and Nickel-Plated Shears.
George Manby & Co., Champion Razors.

The Lee Arms Co., Red Jacket Revolvers, British Bull-Dog Revolvers and Zulu Guns.
Manhattan Roller Skate, Climax Door Springs.
Also, a full line of Single Breech-Loading Shot Guns and Revolvers, both Single and Double Action.

BAEDER, ADAMSON & CO.,

Manufacturers of SAND & EMERY PAPER & EMERY CLOTH.

(Also in Rolls, for machine work.)

Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felt-
ing for Covering Boilers, Pipes, &c., Cow Hide Whips.
PHILADELPHIA, 730 Market St., BOSTON, 143 Milk St.,
NEW YORK, 67 Beekman St., CHICAGO, 182 Lake St.

CARRIAGE,

WAGON,



AND SEAT

SPRINGS.

WESTON'S

DIFFERENTIAL PULLEY BLOCKS.

CAPACITIES FROM 1-8 TON TO 10 TONS.

ONE MAN CAN LIFT 5000 POUNDS.

THEY HOLD THE LOAD SUSPENDED AT ANY POINT.

ALL SIZES IN STOCK.

SOLE MAKERS:

YALE LOCK MFG. CO.,

MANUFACTURERS, ENGINEERS AND MACHINISTS.

Principal Office and Works, STAMFORD, CONN.

SALESROOMS:

NEW YORK—53 Chambers Street.
BOSTON—224 Franklin Street.

PHILA.—507 Market Street.
CHICAGO—64 Lake Street.

40 Page Illustrated Catalogue of Light Hoisting Machinery sent on application.

DIRECT

CEARED

affords no special advantage beyond the higher breaking strain.

In regard to telephone lines, it must be considered that in the majority of cases the wires are laid over roofs of houses and across public streets and squares, and the requirements imposed upon them are consequently very exacting. The wire must be capable of being stretched with absolute security between supports for long distances, and its strength must be such as to give ample security against rupture, as an accident of this kind would be attended by serious inconveniences. It must, moreover, be as light as possible, or what amounts to the same thing, the wire must be very thin so as to diminish the strain brought upon the points of support. In order to meet these requirements the conductivity of the wire, which naturally diminishes with its size, is an item of secondary importance. In order to get a clear idea as to what material is most suitable for such lines, and to what extent one material is to be preferred to another, it is necessary, first of all, to find the resistance which may be allowed without detracting from its suitability for the purpose in question. Practical results of a reliable nature do not appear to have been obtained up to the present time, but it is said by many that a phosphor-bronze wire .8 mm. in diameter has sufficient conducting power, and that the objection to a wire 1 1/4 mm. in diameter lies simply in the difficulty in handling and fixing the same on the roofs. From Table 1 it appears that a phosphor-bronze wire .8 mm. in diameter has a resistance of 164 S. U. per km., and it is to be assumed that this resistance is admissible; as, however, wires no smaller than 1 1/4 mm. in diameter are used, and as these have a resistance of 67.4, or, in round numbers, 68 S. U. per km., such sizes of wire have been chosen for the comparison of the materials in Table 2 that all wires have the same conductivity, namely, 68 S. U. per km.

Reviewing Table 2, Messrs. Felten & Guilleaume make the following comparison:

TABLE 2.—COMPARATIVE TABLE OF TELEPHONE WIRES MADE OF DIFFERENT MATERIAL, HAVING THE UNIFORM RESISTANCE OF 68 S. U. PER KM. AT 15° C.

Name of materials.	Size of wire.		Breaking strain.		Weight per 1000 m.—Kg.	Maximum span with a pull of 25 kg. per 100 m.—M.		Minimum pull for a span of 100 m.—M.		Price.	
	Exact.—Mm.	In round figures.—Mm.	Per sq. mm. of section.	Proportion.		Per 100 m.—M.	Proportion.	Per 100 m.—M.	Proportion.	Per 1000 m.—M.	Proportion.
Phosphor-bronze.....	1.25	1.25	55	67	100	10.24	92	0.82	100	35.00	100
Copper.....	0.98	0.98	88	8	12	2.52	48	1.58	80	240	6.85
Galvanized puddled iron wire.....	1.68	1.7	7	91	136	17.34	79	0.95	155	59	6.75
Galvanized ingot iron wire.....	1.60	1.6	65	134	106	15.36	128	0.50	139	59	7.53
Galvanized patent 1 Soft.....	1.80	1.8	95	242	361	10.44	187	0.40	203	64	12.44
cast-steel wire 1 Hard.....	1.89	1.9	140	397	593	21.07	275	0.27	370	69	14.04

Copper.—A comparison with copper shows that a phosphor-bronze wire of the same resistance as copper wire is about four times as heavy and costs six times as much, admitting at the same time of a space between the points of support two times as great.

Galvanized Puddled Iron Wire.—A galvanized puddled iron wire, in order to have a resistance equal to that of a phosphor-bronze wire 1 1/4 mm. thick, must be about 1.7 mm. in diameter, its breaking strain being less in the proportion of 40 : 55, and its price being only 10 1/2 per cent. of the price of phosphor-bronze wire of equal resistance.

Galvanized Ingot Iron Wire.—Ingot iron wire has already been extensively used for telephone purposes. Its tenacity and ductility render it very desirable. Its conductivity is such that a wire 1.6 mm. in diameter is equal to that of a phosphor-bronze wire 1 1/4 mm. in diameter, or a puddled iron wire 1.7 mm. in diameter. The supports may be placed further apart than with phosphor-bronze wire, in the proportion of 139 : 100. A unit of length of ingot iron wire of equal conductivity weighs about one-half more than phosphor-bronze wire, and will consequently exert a somewhat greater strain on the points of support. Comparing it with puddled iron wire it admits of spans one-half longer, the strain on the supports being 10 per cent. less, and for equal lengths and equal conductivities its price is only about one-fifth of that of phosphor-bronze wire, or about 10 per cent. more than that of puddled iron wire.

Galvanized Patent Cast Steel Wire.—This material probably affords the greatest security against the dangers of rupture and the disagreeable results due to such accidents. In consequence of its high limit of elasticity it is not affected so much by strains caused by sudden changes of temperature, and on account of its high breaking strain the spans may be of considerable length. Its breaking strain is about six times greater than that of copper, three and one-half times greater than that of puddled iron wire and other soft iron and steel wires, three times greater than that of phosphor-bronze and two and one-fifth times greater than that of ingot iron wire. With a conductivity equal to that of phosphor-bronze, it will strain the supports about twice as much as this material, one-fourth more than puddled iron wire, and one-third more than ingot iron wire. It will thus be seen that the choice of material depends very much upon whether the distance between the supports or the lighter construction of the line is of paramount importance. With regard to price the table shows that patent cast-steel wire is fully twice as dear as puddled iron wire, and exactly twice as dear as ingot iron wire, whereas it costs two-fifths as much as phosphor-bronze wire. According to the assertion previously made that, as far as conductivity is concerned, a phosphor-bronze wire 0.8 of a mm. in diameter is sufficient, a galvanized patent cast-steel wire 1 1/4 mm. in diameter, with a resistance of 156 S. U. will do just as well. A comparison of the phosphor-bronze wire 1 1/4 mm. in diameter with a patent cast-steel wire of the same diameter gives the following results:

	Phosphor-bronze wire. 68 S. U.	Patent cast-steel wire. 156 S. U.
Conductivity.....	68	156
Breaking strain.....	67 kg.	375
Weight per 1000 m.....	11	95
Price per 100 kg., m.....	3.30	m 72
Price per 1000 kg.....	35.20	6.84

In this case the phosphor-bronze wire has less than one-half the resistance of patent cast steel wire, and the latter could be spanned over a distance about three times as great, being 14 per cent. lighter in weight, and the strain brought to bear on the supports would be proportionately less. Galvanized patent cast-steel wire at the present time is used in sizes of 2, 2.2 and 2.5 mm.; but if the minimum limit of conductivity can be placed as low as above stated, cast steel wires of 1.2, 1.4 and 1.6 mm. are quite suitable, the resistance, breaking strain, &c., of such wires being as given in the following table:

	Patent cast-steel wire (galv'd.) mm. diam.	Phosphor-bronze wire mm. diam.
Resistance, S. U.....	1.2 1.4 1.6	1.25
Breaking strain, kg.....	168 224 252	67
Wght. per 1000 m., kg.....	9 12 15 1/2	11
Price per 100 kg., m.....	72 71 70	330
Price per 1000 m.....	6.50 8.50 11	35.20

Compared with a patent cast-steel wire 1.6 mm. in diameter, a phosphor-bronze wire 1 1/4 mm. in diameter would offer a resistance less by about one-third, and weigh less by about 20 per cent., but would require three times as many supports and cost three times as much. Judging, therefore, from these results, it would appear that galvanized patent cast-steel wire is, in many respects, to be preferred as a material for electrical transmission. A process now employed in the United States for increasing the conductivity of steel and iron wires, by means of a galvanic deposition of copper, is worthy of some attention. This coating of copper is about 0.1 mm. in thickness, increasing the size of the wire, therefore, by about 0.2 mm. If it were intended to provide a cast-steel wire 1.6 mm. thick, and of a high temper, with a copper covering of this description, the resulting wire would be 1.8 mm. in diameter, and the sectional area would be increased by 0.534 sq. mm. Copper having a superior conductivity, as compared with the highly tempered, in the proportion of 100 : 95, the copper coating having an area

of 0.534 sq. mm. would be found equal, in all respects, to a steel wire having a section of 5.62 sq. mm., which, together with the section of the original steel wire (namely, 2.01 sq. mm.), would give a total section of 8.166 sq. mm., corresponding with a wire fully 3.2 mm. in diameter. The steel wire provided with a coating of copper in this way, would also have a resistance equal to that of a galvanized steel wire 3.2 mm. in diameter, and a breaking strain equal to that of a steel wire 1.6 mm. in diameter. It would weigh about 20 kg. per km., and the strain on the supports would be greater in proportion of 50 : 15, and the supports would have to be nearer together in the same proportion. The conductivity of the wire would, however, be quadrupled, and, as compared with a phosphor-bronze wire 1.8 mm. in diameter, such a coppered steel wire, 1.8 mm. in diameter, could be spanned over double the distance, would weigh 10 per cent. less, have a resistance about one-fourth less, and cost only one-third as much. In conclusion, it may be mentioned that aerial lines, consisting of wires fixed to insulators, can be regarded only as temporary in large cities, as the number of wires has, in many places, assumed such proportions that a still further extension seems hardly possible. The necessity of placing the wires underground in larger cities is, therefore, attracting considerable attention, and with proper coverings for the wires, it cannot be doubted that such a course will ultimately meet with success.

SCIENTIFIC AND TECHNICAL.

Formation of Coal from Marine Algae.

The theory that the various beds of coal had their origin in immense deposits of marine algae, contrary to the generally prevailing opinion that they originated from accumulations of terrestrial plants, appears to be now meeting with acceptance by many geologists. The theory was advanced by the late Prof. F. Mohr in an interesting work entitled the "Geschichte der Erde," and in which he supports his views by many ingenious arguments, some of which have since been confirmed. The luxuriance of submarine vegetation in many portions of the ocean is astonishing, the Southern hemisphere appearing to be the region in which these algae occur most abundantly. In the neighborhood of Terra del Fuego, for example, a fucus-covered bank was passed which had a depth of more than 24 fathoms. Since the leaves of the *Fucus giganteus* were buoyed up everywhere on the surface, this plant must have had stems longer than 144 feet, as they never grow up vertically, but always inclined at an angle. Darwin compares the primeval woods of the South American Continent with those of the bottom of the Antarctic Sea, and declares the latter to be by far the grandest. Mohr mentions several facts tending to confirm his view of the origin of coal. One of the most noteworthy is the very small percentage of mineral matter in the majority of coals, which is very much less than that found in peat, lignite, &c., which are of terrestrial origin. Again, the considerable percentage of nitrogen found in coal is a confirmatory fact. The distillation of coal invariably develops considerable quantities of ammonia, which is rarely developed from peat or lignite. This large proportion of nitrogen is referred by Mohr to the innumerable animals that lived on the seaweed, from which he believes the coal was

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

METALLIC AMMUNITION,

Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,

Guaranteed Superior to any Imported.

THE UNION METALLIC CARTRIDGE COMPANY,

BRIDGEPORT, CONN.

PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.



PERCUSSION CAPS.

F. C. Trimmed Edge, W. Proof.

F. L. Ground Edge, W. Proof, Foil Lined, equal to any imported.

D. W. P. Ground Edge, W. Proof, Central Fire, equal to any imported.

Musket, Paper and Tin Boxes.

Berdan, Orcutt and Wesson Primers.

Bullet Breech Caps.

PAPER and BRASS SHOT SHELLS.

PAPER.

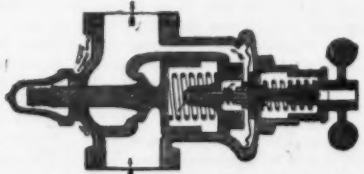
Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.

BRASS.

Berdan, Solid Anvil. Sturtevant, Movable Anvil. Buffington, Movable Anvil. Berdan Primer.

Kenney's Patent Indentation to prevent Wads from starting.

AGENTS: HARTLEY & GRAHAM, New York.



Curtis Pressure Regulator.

Is made entirely of metal; occupies the same space as a globe valve. It has no glands or packing, and is a lock-up valve. Write for circular. Manufactured by

CURTIS REGULATOR CO.,

61 Beverly Street, BOSTON, MASS.

General Agents.

A. ALLER, 103 Liberty St., New York.

JOHN TUCKER, Jr., 155 N. 3rd St., Philadelphia.

E. J. MOORE, 8 South St., Boston.

COBB & DREW

Plymouth, Mass.,

Manufacturers of Copper, Brass and Iron Rivets; Common and Swedes Iron, Leathered, Carpet, Lace and Climp Tacks; Finishing, Hungarian, Trunk, Clout and Cigar Box Nails, &c. Rivets made to order.

NEW YORK AGENCY,

GRUNDY & DISOSWAY,

HARDWARE,

165 GREENWICH STREET,

Agents for the Philadelphia Star Carriage and Tire Bolts.

Romer & Co.

Established 1837.

Manufacturers of Patent Scandinavian or Jail

Locks, Brass Pad Locks for Railroads and Switches.

CARRIAGE LAMPS & LANTERNS.

147 to 145 Railroad Avenue, NEWARK, N. J.

Illustrated Catalogue sent to the trade on application.

AXLES

All kinds Wagon & Carriage Axles

Manufactured by the

LAMBERTVILLE IRON WORKS.

LAMBERTVILLE, N. J. Send for prices.

MINERS' CANDLES.

Superior to any other Light for Mining

Purposes. Manufactured by

JAMES BOYD'S SON,

Nos. 10 & 12 Franklin St., New York.

THE BAKER GUNS.

OUR DOUBLE GUN. OUR NEW THREE-

The Best Gun made For DURABILITY & Shooting Qualities



Price, Best English twist barrels, \$45. Damascus Steel, \$60 to \$200.

Liberal Discount to the Trade

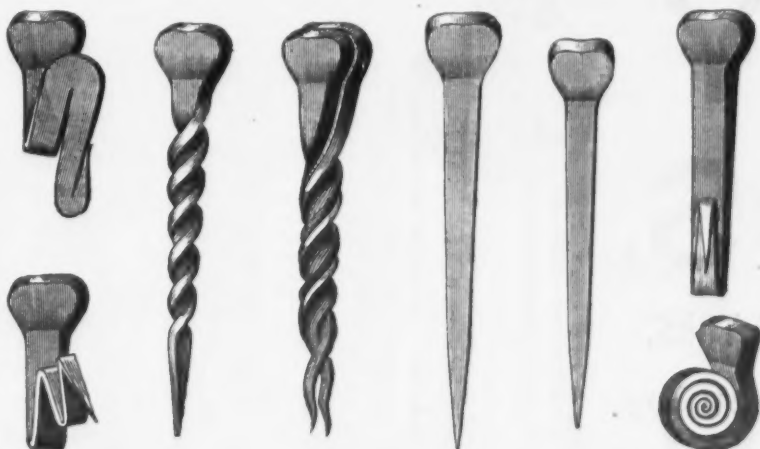
SEND FOR DESCRIPTIVE CIRCULAR.

L. C. SMITH, Maker, Syracuse, N. Y.



Price, \$75 to \$250.

The gun is light and compact, from 9 to 10 lbs. weight. The rifle is perfectly accurate.



SARANAC HORSE NAIL CO.,

PLATTSBURGH, N. Y.

S. P. BOWEN, Pres't and Treas.

W. S. GUIBORD, Sec'y.

AGENTS:

ELY & WILLIAMS, Philadelphia and New York.

S. H. & E. Y. MOORE, Chicago.

SLIGO IRON STORE CO., St. Louis.

S. G. B. COOK & CO., Baltimore.

Correspondence Invited.

FARM BELLS

This cut represents the style of our several sizes of Farm Bells.

These Bells are manufactured by a secret process, and from the VERY BEST QUALITY OF BELL METAL. For volume and richness of tone they have no equal.

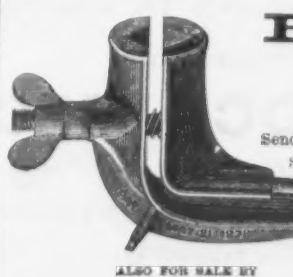
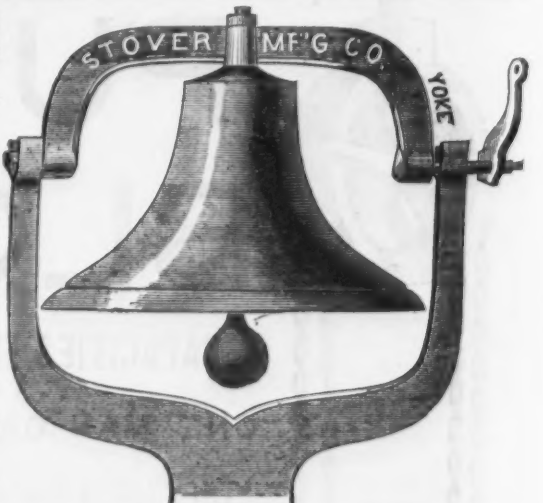
A very liberal discount to the trade. Send for price list.

STOVER MFG. CO.

Freeport, Ills.

ALSO MANUFACTURERS OF GENERAL MACHINERY.

Barb Wire Machines a Specialty.



REED & CO.,

Manufacturers of

HARDWARE SPECIALTIES.

Send for circular.

Samples sent by mail for 75 cents.

HIGGANUM, CT.

Liberal discount to the trade.

REMINGTON ADJUSTABLE

SOCKET WRENCH.

For carriage use it has no equal.

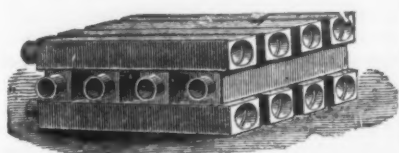
In its use there is no wearing of nuts. No greasy fingers. No nuts dropping into dirt. No necessity of having a close wrench for each carriage. All owners of carriages or wagons will find in this an article which will prove satisfactory in every particular. Are made of the best malleable iron. Two sizes.

ALSO FOR SALE BY C. E. JENNINGS & CO., 98 Chambers St., N. Y.



A. WYCKOFF,

Manufacturer of



CHAIN PUMP TUBE

Special prices to the wholesale trade for the next 30 days.

122 Railroad Avenue, ELMIRA, N. Y.

R. COOK & SONS,

Manufacturers of

Carriage & Wagon AXLES,

WINSTED, CONN.

ESTABLISHED 1839.

N. Y. MALLETT and HANDLE WORKS



Manufacturers of

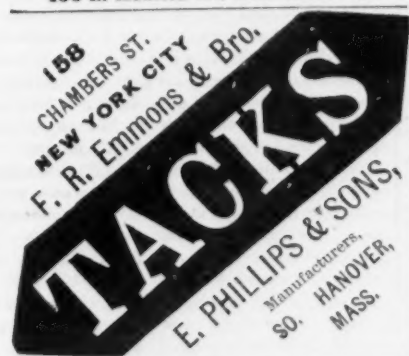
MALLETS,

Hawking Bees, Hawking and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles, Also

COTTON AND BALE HOOKS.

Patented Feb. 13, 1877; a new combination of Hooks.

456 E. Houston St., New York City.



John Waldron,

Manufacturer of

Sprout's Double and

Single Shear

Horse Hay Forks

And

Sprout's

HAY ELEVATORS,

PULLEYS and

GRAPPLES.

Send for Circulars.

Muncy, Lycoming Co., Pa.



The Patent Combined

Dinner Pail and

Lantern.

The most perfect Dinner Pail

for dinner and a lantern at night.

Manufactured by J. H. HAIGHT,

PORT CHESTER, N. Y.

Sent by express on receipt of

\$1.00. Agents wanted.

Keystone Screw Co.

17th and Venango Streets,

PHILADELPHIA.

J. Billerbeck & Co.,

Manufacturers of

Iron Gimlet-Pointed Wood Screws

W. & J. TIEBOUT,

Manufacturers of

Brass, Galvanized & Ship

Chandlery Hardware,

No. 23 Chambers St., New York.

Vulcanized Rubber Fabrics

ADAPTED TO

MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevators,
Steam Hose,
Piston Rod Packing,
Gaskets and Rings,



Vacuum Pump Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Billiard Cushions,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than twelve years, also those for the great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brooklyn, and many others; in fact, the largest Belts for the largest Elevators in the world.

A single carrier belt in the Penna. R. R. Elevator is over 200 feet long, weighing 18,000 pounds, and has run perfectly from the start.

LINEN and COTTON HOSE.



Pat. 644. Plain and Rubber Lined.

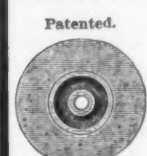
Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c



"TEST" HOSE.

"CABLE" ANTISEPTIC

Emery Wheels and Packing.



Patented. ORIGINAL

Solid Vulcanite EMERY WHEELS

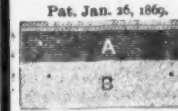
Emery Wheel.

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.



Section of Emery Wheel showing Iron Center.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.



Pat. Jan. 26, 1866. PATENT ELASTIC

Rubber Back Square Packing

BEST IN THE WORLD.

For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps.

B represents that part of the packing which, when in use, is in contact with the Piston rod. A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction. This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 3 inches square.

Corrugated Rubber Mats and Matting,



Pat. 11,208, 213,601. For Halls, Flooring, Stone and

Iron Stairways, &c.

This practical and indispensable article—especially for wear where exposed to ice, snow or slush—was first introduced by this company several years ago, and its real value is in being

almost indestructible, when

proper materials are used in

its manufacture, whilst the cheap,

inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address

NEW YORK BELTING & PACKING CO.,

Warehouse, 29 Park Row, New York.

JOHN H. CHEEVER, Treasurer.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark, also "Riverlin Works."



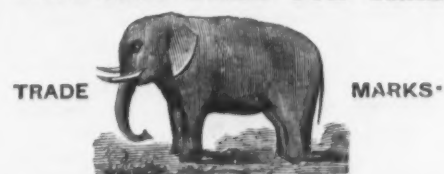
PHOSPHOR-BRONZE

WOOD SCREWS.

A Specialty of Great Resistance to Corrosion; Durability and

Strength for all Exposed Work.

ORIGINAL PACKAGES BEAR OUR TRADE MARKS:



"Phosphor-Bronze."

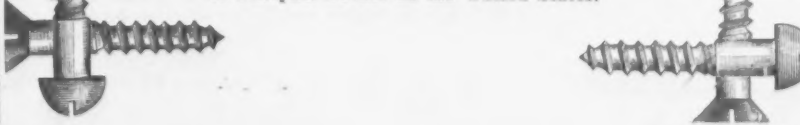
Price Lists and Discounts on Application to

THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,

No. 512 Arch St., PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers

of Phosphor Bronze in the United States.



formed. One other important fact that speaks in favor of the origin of coal from marine algae is the presence of bromine and iodine in coal soot, which was proved by Mohr and confirmed by Professor Landolt. This fact is very significant, since the presence of these elements would seem to be a certain indication of a marine origin of the substances containing them. The great source of bromine and iodine is from the seaweed (kelp) gathered from the sea shores. Taking these facts all together, they lend the strongest probability to the theory that the great coal beds originated from immense depositions of marine plants, and not, as has hitherto been very generally believed, from terrestrial vegetation.

Spontaneous Combustion of Lamp Black.

Lamp-black, if packed in a leaky cask when freshly prepared, condenses the atmosphere gas on its surface, which, owing to the porous nature of the substance, is very large in proportion to its weight. In condensation the gases give out a certain amount of heat, which, under favorable circumstances, is sufficient to cause the ignition of some inflammable substance accidentally present, and this, by combining with the condensed oxygen, liberates heat enough to cause the ignition of the vegetable black, which, when once started, soon spreads until the contents of the cask become red hot. The spontaneous ignition is not infrequent in many large carriage factories, and builders' shops have been destroyed solely from this cause. So well is it known now, that various devices are adopted to obviate the chances of disaster. A large London firm pack the lamp-black in half-pound packages, done up in brown paper and then packed in casks. The use of printed paper would insure ignition from the absorption of the oil in the printing ink by the lamp-black, generating gas which would speedily produce ignition. One among many instances of well-attested cases of spontaneous ignition occurred at a large carriage works at Grantham, England, in a shop far away from fire or the chances of a spark. The paint shop, says the *English Mechanic*, was gradually illuminated on a mild summer's evening during daylight. It was noticed through the workshop windows, and seen to be a tub of loose lamp-black consuming the cask. It was easily carried out on to the grass to finish its work. It was thought that, being near the grinding-paint stone, some oil had been splashed into it, or an oily rag had been dropped into the lamp-black. The secret was soon found out by the pallet knife being among the ashes of the cask, having been carelessly dropped in with some wet paint on it, or even without wet paint—the dry, oily paints which accumulated on the blade, near the handle, would be sufficient to cause ignition. It is not the large quantity of oil, but the small quantity, which is the cause of it. This is so well known that some coachmakers, when they receive lamp-black, put it into a sound cask, and pour enough linseed oil into it to saturate the whole.

The Selenium Photometer.

It is known that the electric resistance of selenium diminishes under the impact of a ray of light, the most effective rays being those between the yellow and the green, or, in other words, the most luminous rays. Messrs. Siemens and Halske, of Berlin, have applied this principle to the construction of a photometer, which, however, can be useful as a standard only between lights of practically the same color, and will measure the most luminous rays in each. The instrument consists of a Thomson reflecting galvanometer receiving a beam of light from a lamp placed at right angles to it, and reflecting it on the scale in front. The rays are bent aside by a prism, and fall upon the mirror in such a manner as to light the zero of the scale. The selenium cell is attached to a copper tube about 0.12 in diameter and 6 inches long, blackened inside and mounted perpendicularly on a vertical stem, supported by a circular base on three adjustable screw feet. From this base projects a graduated limb in the axial line of the tube, and on this limb a standard candle is mounted. It is free to move to and fro along the limb, and can be clamped at any position. The copper tube contains at its hinder part a selenium cell, protected from the light by a small shutter, which is opened and closed at will by means of a press-button in the back end of the tube. The cell is connected in circuit with a battery of 12 or more elements and the galvanometer, and when the light is allowed to fall on it, the resistance declining causes a corresponding deflection of the spot of reflected light on the scale. A deflection is first obtained from the light at a certain distance, and this deflection can be reproduced by the standard candle in moving it up or down the scale.

Bleaching by Electrolysis.

At a recent meeting of the Chemical Society, of England, an interesting paper on a new process of bleaching was read by Messrs. J. J. Dobbie and J. Hutcheson. The basis of the new process consists chiefly in generating chlorine, which is dilute hydrochloric acid or a chlorine salt solution. A low battery power was found to give the most satisfactory results in several experiments. The methods adopted by them consists in passing the cloth to be bleached through sea water between two rows of carbon rollers, the upper roll being connected with one pole and the under roll with the other pole of the battery. The rollers are caused to rotate slowly, thus passing the fabric from one end to the other. Hypochlorite is formed, and on subsequent immersion in dilute hydrochloric or hydrofluoric acid the cloth is effectually bleached.

Automatic Fire Damp Indicator.

Mr. W. S. Macdonald, of Manchester, England, proposes to detect the presence of explosive gases in underground workings by means of a hollow globe or chamber, which he attaches to one end of a bar or beam, the other end being provided with a counterpoise of lead or other material. This bar is balanced on a knife-edge so that it remains in a horizontal position while the atmosphere is in its normal condition. The addition to the atmosphere of explosive gases, such as carburetted hydrogen, which is lighter than

air, will cause the globe to fall and the counterpoise to rise, while the addition to the atmosphere of heavy gas, such as carbonic acid, will cause the globe to rise and the counterpoise to fall. The apparatus is portable, and may be fitted in a mine or other place and connected by means of wires with an electric or other indicator in any convenient position. The globe may be made of india rubber or any other suitable material, and it may be attached to a cord or chain passing over a pulley, and provided with a counterpoise as stated. It appears that trials have not yet been made with this apparatus, and future developments in this direction will undoubtedly attract some interest among colliery owners.

Steam Pipe Coverings.

A brief estimate of the waste of fuel in neglecting to cover steam pipes has recently been made by M. LeBour, who gives the following as the quantities of steam condensed per hour and per year of 300 working days of 10 hours, per square foot of surface for different metals, with steam at about 260° F.:

	Per hour.	Per year.
	Pounds.	Pounds.
Copper.....	0.596	1,728
Wrought iron.....	0.798	2,394
Cast iron.....	0.712	2,136

Assuming that it requires an expenditure of fuel of 1 pound of coal for every 7 pounds of steam, the annual waste of fuel will be as given below for every square foot of the surface of the steam pipe, and taking coal at \$4 per ton, the loss will be as in the second column:

	Waste of coal per annum.
	\$0.40
Copper.....	245
Wrought iron.....	342
Cast iron.....	305

When fuel is scarce and expensive, this waste is much more costly than the above figures show.

Coloring Wood.

The following process for coloring wood has been patented in Germany by Mr. A. Thim, of Berlin: The wood is covered with solutions of metallic salts by means of a brush or otherwise. It is then left to dry for about 12 hours, and is then taken into an air-tight room, in which gases or vapors are introduced, such as sulphuretted hydrogen, ammonia, &c., according to the tint required. The following colors can be obtained: Brown, sulphide of bismuth, formed from nitrate of bismuth; yellow, the sulphide of cadmium, formed from solutions of cadmium sulphate; gold yellow, bisulphide of tin, from solutions of chloride of tin; iron gray to brown, sulphide of lead, from solutions of acetate of lead; green, oxide of chromium, from solutions of chromic acid; red, trisulphide of antimony, from antimony solutions. The process is said to be cheap, and the wood can be colored to any design. The colors obtained are not affected by air, light or water and can be washed. A very cheap solution of hydroxide of iron in chloride of iron is used to impregnate the wood for floors, stair treads and other objects exposed to much wear, and then colored with ammonia. The wood in this case is less apt to burn than when painted in the ordinary way.

Ore Concentration.

As the necessity of working low grade ores becomes more apparent on the Pacific coast the benefits of concentration are more fully considered, new ideas are introduced and new machines naturally result. Among these we may mention Stahl's concentrator, which consists of a long box or channel having different receptacles below its floor, all opening into it. A water pipe, high enough to obtain the required head of water, is placed at one end of this channel, which is also provided with a hopper through which the ore is introduced. Water is allowed to enter, and the discharge end of the channel being smaller than the supply end, the water rapidly fills the channel and rises in the hopper. The water of course fills the chambers or receptacles above mentioned, in which, as well as in the hopper, it is in a state of comparative rest, the current passing through the main channel, its exit being controlled by a gate. The ore when introduced sinks into the channel, encounters the rapid current of water, and portions of it are carried along, settling at different distances, according to their respective densities, those having the greatest specific gravity accumulating in the first series of compartments and so on. The device may be made of any length to suit the treatment of the ore, the limit to its capacity being the available amount of water. Another invention in this direction is that of J. S. Duncan, of San Francisco, consisting in the employment of a rotating pan to which an oscillating motion is given. The earth, sand and water are put upon the revolving pan at its outer edge and fall into a channel there formed. The centrifugal force has a tendency to throw the heavier or precious particles to the extreme outer edge, while the oscillating motion of the pan settles them to the bottom. As the operation is continued, and the material is constantly thrown up against the outer rim, the channel becomes filled with the precious particles, while the sand lies on top and is filled up against the rim, forming a downward grade to the center of the pan where it can be easily drawn off. A further advantage of the rotating pan results from the length of time necessary for the water to return to the center, thus giving the particles time to settle. If the pan were stationary the water would flow directly from the periphery to the center, and, having but a short distance to cover, would be likely to carry some of the precious particles with it and waste them; but by revolving the pan the water is forced to take a spiral course to the center, and thus cover greater space, giving the particles time to drop out. As a consequence of this an increase in the volume of water is felt more gradually and there is no rushing force to the center. Suitable arrangements are made for drawing off the precious metal. S-shaped flanges are placed near the center of the pan to break the force of the water and conduct the latter to a central aperture where it is discharged.

An almost inexhaustible supply of emery stone is reported to have been discovered near Schimerville, Pa.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, August 24, 1882.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.

RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.

Weekly Edition: \$4.50 a year. Issued every Thursday morning.

Semi-Monthly Edition: \$2.30 a year. Issued the first and third Thursday of every month.

Monthly Edition: \$1.15 a year. Issued the first Thursday of every month.

TO ALL OTHER COUNTRIES,

PER ANNUM, POSTPAID.
Weekly Edition: \$6.00—£1-10-0 francs—20 marks—12 florins—6 roubles (coin)—5 lire—32 pesetas.

Semi-Monthly Edition: \$3.50—£1-10-0 francs—10 marks—6 florins—3 roubles (coin)—12½ lire—16 pesetas.

Monthly Edition: \$2.25—£1-10-0 francs—5 marks—3 florins—1½ roubles (coin)—12½ lire—16 pesetas.

REMITTANCES should be made by draft, payable to the order of David Williams, on any banking house in the United States or Europe; or, when a draft cannot be obtained, in postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS in any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the Wm. & Rogers News Company, New York, U. S. A.; and London, England; or the San Francisco News Co., San Francisco, California, U. S. A.

RATES OF ADVERTISING. One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.00; three months, \$15.00; six months, \$25.00; one year, \$45.00; payable in advance.

BRITISH AGENCY. Office of THE IRONMONGER, 44 Cannon St., London.

DAVID WILLIAMS, Publisher, 83 Reade Street, New York.

PITTSBURGH: J. D. WEEKS, Manager and Associate Editor, 77 Fourth Avenue.

PHILADELPHIA: J. D. WEEKS, Manager and Associate Editor, 220 South Fourth Street.

CHICAGO: J. D. WEEKS, Manager and Associate Editor, 25 & 26 Clark St., Cor. Lake.

CINCINNATI: J. D. WEEKS, Manager and Associate Editor, 100 Main Street.

CHATTANOOGA: J. D. WEEKS, Manager and Associate Editor, 100 Main Street.

SOLE AMERICAN AGENCY FOR THE IRONMONGER, Published at 44 Cannon St., London.

The oldest and leading representative of the British Iron and Hardware Trades.

Subscription, postpaid, \$5.00 to countries outside of Great Britain, including Monthly Foreign Supplement and one copy of Ironmonger's Diary.

By a mutual clubbing arrangement between the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on the following terms:

THE IRONMONGER and THE IRON AGE, Weekly, in the United States and Canada, \$7.50 or £1.10; in Great Britain and Ireland, 5.00 or 1.25; in other countries, 8.00 or 1.25.

THE IRONMONGER, Weekly, and THE IRON AGE, Monthly, in the United States and Canada, \$4.75 or 25s; in Great Britain and Ireland, 4.25 or 10s; in other countries, 5.75 or 12s.

CONTENTS.

First Page.—Large Drawing and Stamping Press. Water-Tight Bulkheads. Iron Founding in Bavaria. Coal Beds on Puget Sound.

Third Page.—The Lovett-Müller Electric Lighting System.

Fifth Page.—The Lovett-Müller Electric Lighting Company (Concluded).

Seventh Page.—Greenwood's Planer Chuck.

Ninth Page.—Materials for Telegraph and Telephone Wires.

Eleventh Page.—Materials for Telegraph and Telephone Wires (Concluded). Scientific and Technical.

Thirteenth Page.—Scientific and Technical (Concluded). Ore Concentration.

Fourteenth Page.—The Labor Situation West. Strikes vs. the Market. Iron Men and the Tariff Commission. The Telegraph Wires. Capacity of Freight Cars.

Fifteenth Page.—Capacity of Freight Cars (Concluded). The Proposed Holley Mechanical Laboratory. The Brooklyn Bridge. The Bankers' Convention. Trade Conquests in the East. The Trade Outlook. Utilization of Coal Slack. Tariff Testimony.

Sixteenth Page.—Tariff Testimony (Concluded). Iron Fishery Steamer. The Cambria Iron and Steel Works.

Nineteenth Page.—Washington Notes. New Publications.

Twentieth Page.—Trade Report—Which Iron and Metal Markets. Financial. General Hardware. Iron. Metals. Coal. Foreign Trade Movements.

Twenty-first Page.—Foreign Trade Movements (Concluded). Imports. Exports. Old Metals. Paper Stock, &c. Philadelphia. Pittsburgh. Chicago.

Twenty-second Page.—Chicago (Concluded). Chattanooga. Cincinnati. Louisville. St. Louis. Baltimore. Richmond. Our English Letter.

Twenty-third Page.—Our English Letter (Concluded). Foreign. Industrial Items. Labor and Wages. Passenger Car Conveniences. Fire in the Syracuse Iron Works.

Twenty-fourth Page.—Trade Publications. Pennsylvania Fire Clays and Fire Brick. Large Belts. The Tariff in California.

Twenty-fifth Page.—The Iron Age Directory.

Twenty-sixth Page.—New York Wholesale Prices.

Twenty-seventh Page.—New York Wholesale Prices (Continued).

Twenty-eighth Page.—New York Wholesale Prices (Continued).

Twenty-ninth Page.—Philadelphia and Pittsburgh Hardware and Metal Prices.

Thirtieth Page.—Boston Hardware and Metal Prices.

The Labor Situation West.

The chief subjects of conversation in connection with the labor situation West since our last statement, have been three:

1. The action of the Amalgamated Association at their convention at Chicago.

2. The action of the meeting of Western manufacturers held at Pittsburgh on the 16th, and

3. The attempts of the Western mills to start non-union.

In regard to the Amalgamated Convention at Chicago, little by little the action is becoming known. In addition to the change in laws securing to each district a voice in the decision of the rates of wages, and the five years' guarantee mentioned in our last, the officers state that action was taken looking to the correction of abuses by mill committees, to which the manufacturers take so much exception. Under the present arrangements, or at least under the action of committees in the past, mills have often been stopped on most unjust and trivial excuses—excuses that even biased mill committees, composed entirely of workmen, could not approve. It has been the action of these committees, more than all other causes combined, that has created opposition to the Amalgamated on the part of manufacturers, and has led to such determination on the part of so many mills to start up non-union.

The convention, it is claimed, has removed these obnoxious features, throwing such safeguards about the exercise of their power as will remove the objections arising from its misuse. In regard to the nature of these changes, Mr. Jarrett is reported as giving the following outline:

When a member has a grievance he must use every personal endeavor possible to set himself right with his manager. Failing in this he may apply to the mill committee of his department of the works. This committee investigates, and if the complaint is decided to be well founded, the matter is brought officially before the manager or the firm.

Should there be no amicable arrangement follow, the mill committees representing the several departments of the works are called together, and these committees, if they deem the grievance of sufficient moment to take action, call a special meeting of the lodges that have members employed in the mill, and these confer with the vice-president of the district. A statement of the case is then sent under the lodge seal to the general office, where the proceedings are reviewed with the view to determining whether they are in accordance with the rules of the association. If they are found to be legal they are reported back to the lodge or lodges concerned and the vice-president, and a strike may be ordered. There can be no strike during the progress of these proceedings.

This is certainly a vast improvement over the old method, when frequently the first intimation a manufacturer would have of trouble would be a stoppage of his mill; but it must occur even to the workmen themselves that the manufacturers will not peacefully submit the decisions of cases in which they are equally interested with the men to a committee composed of the men alone. This is one great weakness of the Amalgamated, and a point in which the Knights of Labor are far more just than it.

It is also claimed by the officers of the Amalgamated Association that the two vice-presidents of the Pittsburgh district who were not re-elected were opposed to the strike, and hence their failure of re-election is not to be regarded as a condemnation of the strike. It is immaterial whether it is or not. The point of the argument is that their "acts belied their words," that, in view of these acts, the unanimous indorsement of the strike was meaningless. In this unanimous resolution of indorsement they approve of the strike, and then spend hours perfecting legislation that will prevent such a strike from occurring again. The officers of the districts that brought about the strike are not re-elected. While with one breath they approve of the strike, in the next breath they declare they want no more of them hereafter. If they are good, why not have more? The simple English of the matter is that while, as a matter of policy, the convention indorsed the strike, there was a hearty condemnation of the act of Pittsburgh in forcing it upon the association, and a determination not to permit of the recurrence of such a state of affairs again. It was the old verdict, "Not guilty, but you mustn't do it again."

In this we can see nothing derogatory to the dignity of the association. The strike was a mistake. Mr. Jarrett himself has said so. Scores upon scores of the members have said the same. Lodges and districts in the association have repeated it, and the convention would have shown very much less than their wretched wisdom if any foolish pride had prevented them from taking such action as would prevent it ever again being placed in a false position before the public. It would strengthen the association in the estimation of the public if it would at once abandon its untenable position, say it was mistaken, and resume work.

But little has been ascertained about the action of the meeting of Western manufacturers, held on the 16th. It seems that the presentation of the views of the iron men of the West regarding the duties on iron before the Tariff Commission, occupied most of the time. So far as its discussions related to the strike they indicated no weakening, but rather a stronger and more determined feeling in favor of continuing the contest. According to the local papers the men confidently expected some action at the meeting looking to a compromise, but no such movement seems to have been thought of, and the fact that since the meeting several mills have given notice of their intention to start non-union, would indicate that the meeting developed no signs of weakness.

Attempts and preparations for attempts to start mills non-union multiply. The most important is that of Brown, Bonnell & Co., of Youngstown, the firm whose mill contains more puddling furnaces than any other in the United States. This firm called their men together and made them an offer to start at the old rates. They have made the following interesting statement of this conference:

At the conference we offered to sign the old scale at \$5.50. We were respectfully and courteously treated, and listened to with every indication of men desiring to know all the facts. After careful and earnest consideration of 24 hours, they report that, according to their constitution, they have no authority to accept our offer, and ask time to submit it to the proper authority. After very pleasant and earnest statement of facts on both sides, the committee expressed very much regret at not being able to comply at once with our request, and, as we understand it, were entirely satisfied to do so if the constitutional authority will permit. It was understood that we would give all the time that we could, stating that time was now precious, and that in case no understanding could be reached soon, as a business necessity we should first invite any of our own men and those residents of Youngstown to resume work on the basis offered, and if a sufficient number failed to respond, seek elsewhere for men to fill up. This would be done with no spirit of animosity to the union, but as a business necessity. The committee substantially agreed with us upon all points taken, and asked if we had any compromise to offer. We stated that we believed our position, first taken on June 1st, had been fully sustained, and a compromise would be a compromise with wrong, outside the fact first stated that the business would not justify any advance on the old card. After expressions of confidence in Brown, Bonnell & Co. and its officers, and thanks for goodwill manifested and expressed, the committee retired.

The men have since refused to accept the proposition, and they will now resume non-union.

Two days after the meeting of the manufacturers, Reis Bros., of Newcastle, Pa., issued the following notice:

EMPLOYEES OF REIS BROS.—NOTICE. Opportunity is hereby given to all our employees to resume work in their respective positions, at the wages paid under the scale of last year, provided they express a willingness to do so on or before Thursday, August 24, 1882, by reporting their names to us in person or in writing. After that date any positions remaining unfilled will be declared vacant, and we shall proceed to fill the same from all available sources.

REIS BROS. NEWCASTLE, PA., AUG. 18, 1882.

The Springfield (Ill.) Iron Co. have also taken a step in the same direction, as will be seen by the following:

THE SPRINGFIELD IRON COMPANY, SPRINGFIELD, ILL., AUG. 19, 1882.

To the Members of the Amalgamated Association of Iron and Steel Workers, lately in the employ of the Springfield Iron Co.—This company has always understood that you were opposed to the present strike, but were compelled, by the peculiar nature of your organization, to join in it and abide by the decision of your brethren at Pittsburgh. We have also been given to understand that at your Chicago meeting changes would be made which would render you more independent, and enable you to act for yourselves and recede from your present demands. The company has remained quiet on this understanding, but now feels that the time for a positive policy has passed. We have therefore to ask of you,

1. That you return to your respective positions and resume work in all of our different departments at the prices heretofore offered to you.

2. That if you are unwilling to do this, that you start up the rail mill, the steel furnaces and the blooming mill, or any of them, at the old prices, as it is claimed that these departments should not have been stopped. Notice is also hereby given that in case you refuse to comply with these requests, you may consider yourselves discharged from the employ of the company, and that we shall proceed to fill the vacancies thus created with as little delay as possible. A reasonable time will be given for the consideration of this matter, but your immediate attention to it is desired.

By order of the Board of Directors.

CHARLES RIDGELY, President.

While these may or may not indicate a combined effort to start mills non-union, they show a determination on the part of the manufacturers not to yield that must have its effect. It is also significant that for some weeks there have not even been the rumors, that were so frequent before this time, of mills that were to yield and start at the new scale. There is none of the talk now about this not being a strike, but only a stoppage for repairs, while it is the strike this time, and not the manufacturers, who are holding meetings to discuss and vote on the question whether they shall yield. There is also great dissatisfaction at the failure to receive benefits, or strike pay, and notwithstanding the boasts of the amount of money at the command of the association, but very little has been distributed. The association has not to-day enough money to pay one-quarter what it owes the strikers.

If the rule which they enforce against the manufacturers, of pay every two weeks, was enforced against the association, there would be a strike all along the line. All the mills that have started no union are still running, some full handed others with daily increasing numbers.

The 7th of the present month was the 75th anniversary of the trial trip of the Clermont, Fulton's first steamboat, and the first successful commercial pioneer of modern steam navigation. Since that time there has been no interruption in the use of the steam engine for the propulsion of vessels. Other trials had been made, but the commercial conditions were not ripe, and the enterprises were laid aside until a more favorable opportunity. The story we all know. It has been told over and over again. Many persons are still living who remember the day and the trip. It is proposed to erect a monument to the great inventor (or the great engineer, for such he was rather than inventor) and thus to celebrate his great work. In regard to this matter we think the venerable Peter Cooper is right. He believes a monument is a most useless method of expressing

our regard or of commemorating a great action. Few monuments are designed at the present time of sufficient artistic value to make them tolerable on the face of the earth, and it is very rare that one is designed to order that is anything better than an outrage upon the artistic sense of the community. It is far better to endow some great institution, or put in motion some scientific work to be called after the name of the man whom we wish to commemorate. This makes the expenditure a doubly useful one.

Strikes vs. the Market.

The strike of the coal miners of Western Pennsylvania, after continuing for four months and a half, is at an end, and another of the great strikes of this "Strike Summer" has resulted in the defeat of the strikers. This has been a most determined contest. There has been but little violence, the efforts of the strikers to keep men out of the pits being confined mainly to the brass band escorts to which we have before referred; but the cheerful endurance of privations and the long contest—the longest we believe in the history of coal mining at Pittsburgh—has proved the determination of the men, and excites our wonder even if it does not challenge our admiration. This contest has really been between the strikers and the state of the market, and not between the miners and employers. The latter declared that the state of the market did not justify them in paying the old prices. The miners believed it did, and joined issue with the market; but the market was against them, and they have been forced to yield. No doubt the occurrence of the iron strike in the West at the same time as the coal strike has aided in their defeat; but this was a part of the influence that made the market what it was, and the fact that they have succumbed just at the time when many of the influences would turn in their favor, indicates that something besides the simultaneous occurrence of the iron strike has defeated them.

They have been defeated by the condition of the trade, the same influence that defeated the other great strikes that have ended and that will defeat those already in progress. The relation of production or capacity to produce to consumption, has been and is such that higher prices, or even old prices in many cases, cannot be paid. We do not mean to indicate by this that a panic is at hand. We simply mean that the influence of the excessive demand of 1879-80 was to create a scarcity and advance everything. Now that this demand has somewhat fallen off and the capacity to produce has adapted itself to the demand, prices must settle back to a normal rate, and even to rates below the normal, and neither unions nor strikes can wholly prevent this, though they may regulate and limit the extent of the reaction. The market will win every time. It will defeat the employer when it is rising and compel him to pay rates asked without a struggle, or if he enters into a contest will defeat him. On the other hand, it will defeat the employee who, on a falling market, attempts to enforce higher rates of wages or prevent their decline. The true principle of the payment of wages is the sliding scale. We are aware of its incongruities, its injustices, and the difficulties of determining upon a proper basis; but it is less incongruous, less unjust and has fewer difficulties than common the method of fixed wages. It is based in theory on the true idea of wages—that it is a distribution of product; it has the idea of co-operation without its difficulties, and roughly gives both parties the benefit of advances in the market and compels them to share in the decline.

Iron Men and the Tariff Commission.

The iron industries of the country seem to be actively at work preparing their views for presentation before the Tariff Commission. We have already referred to the meeting of the Executive Committee of the American Iron and Steel Association that was held at Cresson, at which steps were taken for the holding of a general meeting of all the iron trade, East, West and South, at the same place, on September 12th. As preparation for this meeting several meetings of other iron associations have either been held or have been called. The sheet, plate, hoop iron and steel men of Pittsburgh have already held meetings. A general meeting of the Western iron men, very largely attended, was also held in Pittsburgh on the 16th inst., at which a committee, with Mr. Jno. W. Chalfant as chairman, was appointed to select a committee, representing all classes of iron in the different sections of the West, to prepare their views as to the proper rates of duty for presentation at the Cresson meeting. It is also understood that the iron ore producers either have met or are to meet at Cleveland at an early date. Meetings of the Eastern Iron Association and of the Atlantic States Nail Association have been called at Manhattan Beach for the evening of the 24th, at which action on the subject will be taken. All this indicates that the iron men are determined to take more heed of the form of the tariff this time than ever before. In the past it has not been what has been done that has given cause for complaint on the part of the iron men, but what has been left undone. It has been the erroneous Treasury decisions that have crept in through legislative inadvertency—that have injured them so much, and it is to this especially that they will devote their attention, to see that the law be put in such a form that, so far as human foresight

can prevent, it will be impossible hereafter that these decisions shall permit of the importation of iron at less duties than the articles out of which they are made.

The Telegraph Wires.

The recent fire which destroyed Hecker's flour mills, in this city, ought to teach one very impressive lesson. An inspection of the ruins shows that no less than 84 lines of telegraph wire were broken, either by the firemen or the falling walls. On the west side of the building the poles carried 43 wires. On the south side there were two lines on each side of the street, each one of which carried 25 wires. The annoyance to the firemen and the danger from the broken wires were both very serious. Had it been necessary to raise ladders against the building and to fight the fire from an elevated position, no doubt the troubles would have been much more severe. It very fortunately happened that in that part of the city the lines of poles were neither large nor numerous. Should a fire occur on the same street half a mile nearer the Battery, the dangers from this source would be almost infinitely greater, for then a line of poles would be encountered each one of which carries about 150 wires. In many parts of Broadway and in some of the lower streets of this city the number of wires is almost incredible. Whenever fires occur in such streets the wires are so numerous as to render ladders and water towers almost useless, at least until after the lines can be cut and space made in which to handle them.

The moral is that we must bury the wires under ground. The cost to the companies will be very heavy, but we presume within a very short time the reduced repairs and the freedom from interruption will more than counterbalance the expense of putting them under ground. It is, of course, no small matter for a company to have 85 wires broken in a single day, and where a fire occurs under favorable conditions, a very much larger number of wires might be cut off. A heavy snow-storm, followed by sleet and a freezing rain, has on more than one occasion practically disabled the telegraph companies of the whole city, and sometimes one or two months have elapsed before all the private and public lines were in working order again. As business men depend more and more upon the telegraph for the transaction of their business, these delays are increasingly vexatious, and cannot much longer be tolerated when a feasible and not very expensive method of obviating them can be found. When we have intelligent and far-sighted legislation in regard to this matter, we think there will be very little opposition from the telegraph companies.

Not long since, in conversation with a gentleman who had been the leading man in a telephone company, we asked him why he had abandoned the company and gone into another line of business. His remark was worthy of careful attention. He said that when he began to go out and look after the lines themselves, to see where the property was situated, and then realized the fact that their lines and their poles were at the mercy of the public, and that at any time the householder might strip their wires from his roof or cut down their poles in front of his house, he came to the conclusion that the property was in too precarious a position for him to wish to keep his money in it. In many parts of the city people actually will not put in telephones, simply because they do not wish to tolerate the nuisance of the wires and poles in a handsome street. Our dry climate and the consequent admirable insulation of our aerial lines, while very advantageous, is certainly against the best interests of the communities of our large cities, since it has kept the lines above ground long after they should have been decently buried.

Capacity of Freight Cars.

At the present time when car builders are considering the feasibility of 30-ton freight cars, and finding that for these cars even the Master Car Builders' standard is none too large, it is interesting to look back at the vote on the sizes of journals taken at the Boston meeting of the Association when the standard axle was adopted, and to see what the opinion of the Association was upon the matter of sizes of journals. Looking over our notices of that meeting we find that there were less than half a dozen men who were at that time in favor of a journal of more than 3¼ by 7. There were, however, a half dozen who voted for 4 by 7 or larger. We think even the most conservative men who then considered a 3¼ by 6 amply large for the requirements of that day, are now convinced that the Car Builders' standard has none too large a journal for a 30-ton car, and that a 4 by 7 would possibly be preferable.

It is a question of no small importance at the present time, when larger freight cars are imperatively demanded by the growing traffic, whether the size or the number of journals shall be increased. It is even suggested that the number of trucks be increased, that a 6-wheel car with 3 trucks, rather than a car with two 6-wheel trucks, be employed. With three 4-wheel trucks a car could be considerably lengthened so as to make it equivalent in its framing to two cars with a door in the middle between them. In going round curves very peculiar strains would undoubtedly be set up in the framing, by the fact that the point of support in the middle would be considerably to one side of the center line of the car. The material increase, how-

ever, in the load to be carried would allow a large margin of freight in the frame, while the ratio between dead and paying weight would be reduced, the larger load being obtained with a comparatively slight increase in the deadweight and a considerable increase in strength.

The increased capacity of freight roads is developing some interesting problems in car construction. It may be found that with the increased facilities for handling iron and rolling shapes of almost any desired section, that an iron floor framing for freight cars can be obtained both stronger and cheaper than one of wood. If this is done, may it not be possible to dispense with any timbered side framing and make the covering and sides of the cars merely strong enough to sustain their own weight and the ordinary shocks incident to traffic. If this is once done without depending upon them for strengthening the body, an enormous advantage will be gained in the way of dispensing with timbered framing, which is essentially weak, and which, by reason of a large door opening, fails to obtain very essential points for a perfect truss. Braces and struts are of necessity left out of the doorway of an ordinary car, and thus one very important panel of the truss has to depend for its stiffness upon other members. In an iron car the strength of the floor beams is much greater than that required for carrying the load.

The Proposed Holley Mechanical Laboratory.

Of equal importance with the organization of the business management, which was considered in our last issue, will be found that of the scientific department. Of course, no comprehensive plan of its workings is possible until it is positively ascertained what amount will be available for the purpose at first. That there is but little likelihood of obtaining sufficient means for starting all the different scientific sub-departments in full operation right in the beginning, is self-evident. The principal question, then, is to decide primarily upon what kind of work is most imperatively needed, and therefore the most important. This decision once made, a preliminary estimate of the first cost is easily arrived at; but it will have to cover not only the necessary outlay for the special work decided upon, but also the cost of such necessary preparations for the extension of the scope of the institute as are easiest and cheapest made right at the start, and would be far more expensive if left for the future.

Probably the great majority of the profession will agree with us in saying, that the work most needed, the most imperatively demanded of such a laboratory, would be first of all a thorough revision of our safety coefficients, based as they are at present upon the entirely fictitious, and, in many cases, even incorrectly given, ultimate strength of the materials. Nothing short of the positive establishment (and acceptance by the profession) of the "working" strength of the different materials of construction will ever put a stop to the fatal errors committed under our present methods of dimensioning. Take, for instance, into consideration the fact that small test specimens of wood show much less strength per unit of section than the full-sized beam or sawed piece of timber which enters a structure, while, on the other hand, the small test specimen of iron or steel shows far greater strength than the full-sized truss member. The relative ultimate strengths of these materials, as given in the hand-books, have all been established by means of specimen tests, and yet we use indiscriminately a factor of from 10 to 12 in wood construction, and a factor of from 3 to 6 in iron and steel construction. We are not only conscious, but we positively know, when designing in iron or steel, that the area of section is not the true measure of the tensile strength of the piece under consideration, but that length, as well as ratio of thickness to width, exerts its influence upon the effective tensile strength. Yet, with that knowledge, we have gone on dimensioning on the old plan, simply for lack of any formulation of these influences.

Here is a field for investigation which, if thoroughly explored, would alone not only repay the outlay incurred for it, but the results obtainable therefrom would be of such magnitude as to be truly worthy of Holley's name. Moreover, there would seem to be an especial fitness in having this task of establishing the true working strength of structural materials accomplished by American engineers. For years past it has been conceded by all whose mental horizon was not narrowed by national or professional prejudice, that our leading bridge works and machine shops had no peers abroad, while in both design and workmanship our bridges and machines are to-day defying all competition. Having done so much for the development and improvement in the different branches of our profession, without any governmental aid, is it not our place by right to keep in the lead, by doing for ourselves what the engineers of all other countries expect their respective governments to do for them in the dim future?

The task may at first seem an appalling one from the magnitude of the field to be covered. But when the work is once concentrated in one hand, as it were, the desultory efforts of individual experimenters, which is all we have now to rely upon for new information, will cease to be so often mere repetitions of what others have done before, and in this way alone great saving of

time and material will be effected in the obtaining of positive results. A good illustration in point of what a large amount of really good and conscientious work of this kind can be performed for a very small sum of money, is the work done at the United States Arsenal at Watertown with the Emery testing machine during the past year. We shall have occasion to refer more extensively hereafter to this work of Col. T. T. S. Laidley, as reported to the Chief of Ordnance.

Moreover, it is safe to presume that the work will be entrusted to hands which will not indulge in the tedious and silly practice of indiscriminate destruction of material for the sake of manufacturing cumulative testimony, as it were. No more chain-cable tests, pray! A dozen well-conducted experiments, in which every attending circumstance which might affect the result is carefully noted, are worth a hundred experiments made under different circumstances and by different observers.

The selection of men for this work will be no easy task. Specialists, men used to experimenting and to observing and of great technical ability, will have to be chosen. But they must also be men free from all pet theories, and willing to accept the teachings of the material, without regard to any preconceived notions of how the material "ought to act" under given circumstances. We have all heard of the professor who said: "I don't care for your facts—here is my theory; and if your facts don't agree with it—all the worse for the facts!" and we sincerely trust we shall have the pleasure of missing his presence from the Holley Mechanical Laboratory.

The Brooklyn Bridge.

President Murphy, of the Board of Trustees of the East River Bridge, sent his weekly report to Mayors Low and Grace a few days since. From it and the statement of the chief engineer, we learn that "the work done on the bridge during the past month has been almost nominal." The report is accompanied by a most remarkable communication, said to come from and be signed by Chief Engineer Roebling. We quote:

Hon. Henry C. Murphy, President of the Bridge Trustees:

DEAR SIR.—The question as to when this bridge can be finished is hedged about with so many probabilities, any estimate upon that subject can only be approximate. It certainly cannot be finished this year, and as nearly as I can tell now, it will be the latter part of next year before it is entirely done. It depends entirely upon the deliveries of steel, and as Mr. Sellers has broken every promise he has ever made about furnishing steel. I can make no guess as to when he will furnish the balance. Mr. Sellers is under no bonds of any kind, and he is not making money on his contract with us, so I see no reason why he will be in haste to furnish us with steel. With thousands of tons in the yard, our progress has been blocked for the want of two or three pieces near the towers, and this arises from Mr. Sellers' persistent refusal to make an extra piece of any one size over and above the number required. Some bars are always spoiled in the manufacture, and we are left without certain pieces. To make the few missing bars always takes five or six months by the time the order has made the rounds of Ambria, Midvale and Edgemoor. For the sake of saving themselves \$20, Mr. Sellers puts the bridge to the expense of thousands by keeping everything waiting. This has happened not once, but many times. If every piece of steel were actually in the bridge yard, the trusses could be put up in three months. Had the bridge been built of iron there would have been no delay in supplying the missing pieces, as we could buy thousands at some other mill, but being of steel this cannot be done. I am well aware that Mr. Sellers has had extraordinary difficulties to overcome in the manufacture of the various shapes we have required, and I make no complaint of delays incident to that source. It is avoidable delays which are so galling and costly. The specifications for the terminal structures on the bridge are now ready. It will take one year from the time this contract is given out to complete these structures. To get up the rope driving machinery it will take over a year. Besides erecting the trusses of the superstructure, there is much other work which will go on at the same time. The whole superstructure has to be riveted together and regulated, and the over and under floor stays put up. The floors have to be laid and the whole structure painted several times. After all the weight is on the suspenders and stays must be finally adjusted before the moving load can be let on. If by October next I see any reason for changing my views and extending the time, I will make another report on the subject.

Very respectfully yours,
W. A. ROEBLING, Chief Engineer.

It seems inconceivable how an engineer of Mr. Roebling's reputation can so stultify himself. In 1879 it was pointed out to him that the specifications were drawn so loosely that under them either the contractors or the engineers—whichever was the strongest—might do as they pleased. This, of course, met with a prompt denial, and the forfeiture clause of \$100,000 penalty was pointed to as showing that a faithful performance of the contract could at any time be strongly insisted upon. We would like to know what has become of that clause? There is no published record of any public meeting of the trustees at which that clause was stricken from the contract by resolution of the board. "As Mr. Sellers has broken every promise he has ever made about furnishing steel" is pretty strong language, and quite unmistakable in its meaning, and if Mr. Sellers is satisfied with this characterization of his business integrity we have no cause to think the expression too strong. Why Mr. Roebling should find fault, though, with Mr. Sellers' "persistent refusal to make an extra piece of any one size over and above the number required," is something difficult to understand. "For the sake of saving themselves \$20, Mr. Sellers puts the bridge to the expense of thousands," Mr. Roebling goes on to say. It strikes us that

Mr. Sellers has a perfect right to save all he can, legitimately, in any contract, and that both equity and common sense would dictate the policy of paying him the \$20, instead of fighting and putting the bridge to the expense of thousands by declining to pay for the blunders and imbecilities that were allowed to creep into the specifications. Can there be really any truth in the rumor that Mr. Roebling years ago ceased to be able to write any letters on any subject whatever, and that the communications which appear periodically over his signature are the compositions of those most interested, to shield their transactions behind his name?

At a meeting of the Bridge Trustees, held on Tuesday last, Mayor Low, of Brooklyn, offered the following resolutions:

Whereas, The chief engineer of this bridge, Mr. W. A. Roebling, has been for many years and still is an invalid; and

Whereas, In the judgment of this board, the absence of the chief engineer from the post of actual supervision is necessarily in many ways a source of delay; therefore,

Resolved, That the Board does hereby appoint Mr. Roebling consulting engineer and Mr. C. C. Martin, the present first assistant engineer, to be chief engineer of the New York and Brooklyn Bridge.

Resolved, That in so doing the board desires to bear most cordial testimony to the services hitherto rendered by Mr. Roebling, and to express its regret at the necessity of making such a change at this time.

These resolutions were seconded by Mayor Grace, of New York.

Mayor Low, in introducing these resolutions, stated that he went to Newport to see Chief-Engineer Roebling, and asked him whether he would be willing, in view of his illness, to become consulting engineer, and allow his first assistant, Mr. Martin, to become chief engineer, in order to facilitate the completion of the work. Mr. Roebling was unwilling to agree to such an arrangement. Hence the introduction of these resolutions. After some discussion, in which tributes more or less flattering were paid to the elder and younger Roebling, a motion to lay the whole subject over until the next regular meeting, September 11, was carried. This movement on the part of the ex-officio members of the Board of Trustees is an important step in the direction of quickening the construction of the great bridge. What is to follow will be watched with interest.

The Bankers' Convention.

The Bankers' Convention, whose sessions at Saratoga have just been brought to a close, contributed much valuable information relative to the fiscal system of the country. The address of President Cox was particularly suggestive in its bearings upon the final extinguishment of the public debt and consequent changes in our present National currency. He deprecated the continuance of the exceptional war taxes, which Congress failed to relieve, as hastening unnecessarily the disappearance of the foundation of our monetary system. The address of Colonel Wm. M. Grosvenor, of New York, showing the operation of the clearing house was also well received. "The record of the transactions of the clearing houses," he said, "will sooner or later render possible a 'service of financial meteorology,' so that a 'commercial signal service' will be enabled 'to foretell business storms and to predict changes in the financial weather with most useful results.' At a later period in the session the discussion turned upon the greatly improved condition of the South, which is throwing off the incubus of debt, and, through a partial diversion of its industries in the establishment of manufactures, is entering upon a career of prosperity never before equalled. The convention last Wednesday evening adjourned sine die.

Trade Conquests in the East.

The political disorders in Corea, following the concessions in favor of foreign trade, appear to be only a repetition of the occurrences in Japan subsequent to the opening of the treaty ports. The conservative element will resist stubbornly all innovations. In Japan the result was the downfall of the Teyoon and displacement of the Tokugawa dynasty, which had continued 300 years. The powerful Prince Satsuma, who espoused the cause of the Daimios and their retainers, comprising the Samauri or two-sworded men, fought valiantly, but in vain, for the more progressive Government which came into existence under the direct rule of the Mikado (who before was the spiritual head of an almost mythical sovereignty) became established on the ruins of the ancient régime. In like manner, there is reason to fear that Corea is destined to pass through an ordeal of blood before the high officials of the kingdom submit to a new order of things, or radical innovations of any kind whatsoever threatening the eventual loss of their hereditary rights. The king felt more strongly than his subjects the pressure of foreign influence as against the national policy of exclusiveness. Russia, anxious to acquire a long-coveted naval rendezvous on the coast, or some other power under a convenient pretense, was momentarily liable to break through the flimsy barricade. The fate of Tripoli, and the instance of wanton aggression at Anam, showed the futility of resistance to Western demands. Query: Will the King of Corea, in seeking to avert the danger from without, be enabled to maintain himself against the remonstrances of his own people? Can he propitiate the spirit that is within, and thus conform to the demands of

a modern civilization? The same questions, in a different phase, will be presented when England seeks to penetrate Africa through the splendid trade channel opened by her conquests on the Nile.

Since the above was put in type there comes an apparently authentic report that the King of Corea has been assassinated. Assuming its correctness, it seems probable that the doors are once more sealed against foreign intrusion, and the country must finally undergo the throes of internal revolution or submit to overpowering forces from without.

The Trade Outlook.

Accounts of trade and business in the Western States are as cheering as at any time since the harvest began to ripen, and much activity all through the autumn months is anticipated with confidence. The only drawback is the sluggish movement of grain toward the primary markets, caused by the prevailing low prices. As a rule money is easy, but collections will be slow in some sections until the harvest is gathered. General trade is certainly improving, and is frequently spoken of as better than at the corresponding date last year. The St. Louis Commercial Gazette says:

The situation commercially shows a steady improvement. The corn crop is assured, the other earlier crops have been saved in good condition, and in many cases have been already turned into money. Farmers are in good shape to pay their debts to the country merchants. All lines of trade are active, and values in general firm.

A letter dated Cincinnati, August 19th, says:

The outlook for every branch of business is cheerful. Merchants are receiving the most encouraging reports of the abundance of crops and of the prospects of trade from their traveling men. The orders on manufacturers of mercantile stationery were never larger and more urgent at this season of the year than they are at present. Collections are fairly good, but might be better. Just now actual business, excepting grain, is quiet. The demand for money is very light, and the use of it is in strictly legitimate business. There are no strikes and all manufacturers are working full force, full speed, full time and full capacity. Many of them are behind with their orders.

At St. Paul and Minneapolis, August opened with a largely increased traffic in all lines. It is evident, however, that the movement of grain from first hands is light, and for the present disappointing. In the Southern States there is almost uniform activity at the principal business centers.

The Keely motor stockholders are in trouble again. The mystery of the recent willingness of the funny inventor to impart his secret to one William Boekel, after having persistently refused for years to disclose it to anybody, or even to say what it was like, is beginning to be solved. Three months' study of the apparatus has left Mr. Boekel, apparently, no wiser than before. The inference is obvious that he is a man after Keely's heart, and that henceforth the stockholders may have to support two mysterious beings instead of one. When, in addition, the ears of prowling stockholders are treated to new developments, in the shape of loud explosions in Keely's lair, as if produced by the efforts of a novice to handle mighty forces, the trickery becomes too obvious. The stockholders have played their carefully prepared game and lost it; for of course it is too late now to ask themselves if it was wise to choose Boekel as their representative, on the ground that he was acceptable to Keely; and they cannot well go into court again and demand that still another person shall be the repository of the wondrous secret.

Torpedo boat engines are very nearly as light in proportion to their power as birds, and with higher pressures in their boilers or with lighter boilers, they could easily be made to sustain themselves in the air. Should any of the foreign governments undertake the task of experimenting with flying machines, the most startling results will probably be attained. Many years ago a gentleman in this city made a few experiments in a most eminently practical way. He erected a vertical shaft 15 or 20 feet long, on which a loosely fitting hub was placed. A feather working in a slot in the shaft carried the hub, while it permitted it to rise and fall freely. Wind-mill rams were fitted to the hub, the shaft driven by a belt from a 12-horse engine, and a spring balance connected by a yoke to the hub gave the upward thrust. Light engines were then unheard of, and the lifting power available was rather too small to make it worth while to speculate on the subject. Since that time engines and boilers have been brought down far below the weight needed for the purposes of flying, notably those of the "Vision," stated in the "Growth of the Steam Engine" to weigh only 20 pounds per horse-power, boiler included.

Utilization of Coal Slack.—A series of interesting experiments were recently made in Cincinnati with the view of testing an English process for the utilization of slack or small coal. The experiments were made under the supervision of the inventor, Mr. W. H. Cory, of Cardiff, Wales, where the process is said to have been in successful operation since 1873. The process consists in mixing the slack or dust coal with fire-clay and silicate of soda (for bituminous coal 2 per cent. of clay and 3 per cent. of silicate), and subjecting the block to a pressure of a ton to the square inch of the block surface. The block thus formed is as hard as ordinary coal, and has all its angles rounded to prevent chipping, the surface being glazed by the manner in which the pressure is delivered, the press manufacturing 240 tons in

20 hours. The blocks require 24 hours to become hard and fit for use, as during that time the chemical action takes place, the clay converting the silicate of soda into silicate of alumina, thus turning a soluble into an insoluble, or, in other words, vitrifying the block and causing it to be weather-proof. The tests made on the above mentioned occasion, though lacking fullness in several particulars, resulted satisfactorily, and it is not improbable that the process will be adopted at some future time.

Tariff Testimony.

At the sitting of the Tariff Commission at Long Branch, 21st inst., Mr. Alfred Earnshaw, of Philadelphia, importer of iron ore, read a printed argument for the admission of iron ore and manganese ore into this country duty free, as a means of true protection to the iron and steel trade. The present duty on iron ore, he says, although not averaging more than 50 cents a ton, is a very important factor in limiting the amount that is brought here yearly. Its importation was merely an adjunct of the steel business. To stop its importation would not increase the price of native ore, and would not cause the mining of an additional ton in this country, because to-day every ton of good ore that could be mined here was being mined without any regard to foreign ore. This country required for yearly consumption in steel mills 2,000,000 tons of pig iron, one-fifth of which was imported. This one-fifth controlled absolutely the price of the other four-fifths. To place iron ore on the free list, therefore, would give the American iron makers the chance of driving out of the market the surplus production of pig iron in England. England was chiefly dependent upon the Spanish and African ores for her supply of Bessemer pig iron, and, therefore, the taxing of these ores was simply offering to England that amount of premium. To stop that ore from being imported and to leave foreign pig iron alone, would be like watching the spigot and letting the cask leak at the bung. It was not because foreign ore was cheap that it was used, but because it was low in phosphorus. If a higher value of ore in this country was all that was desired, that end could be at once attained by increasing the duty on pig iron, which, however, he did not advocate. His conclusions were: First, that even a prohibitory duty on ore would not affect the price of native ore; second, that the removal of all duty would not affect the price of native ore; third, that a prohibitory duty on ore would materially increase the importation of Bessemer pig iron; fourth, that free ore would materially decrease the importation of pig iron; fifth, that an increased duty on pig iron would decrease its importation; sixth, that a higher duty on pig iron would stimulate the development of Southern ore beds and the erection of furnaces in the South; seventh, that the higher duty on pig iron would greatly increase the price of ore, and eighth, that the development of the Southern iron business would permanently reduce the price of Bessemer pig iron and Bessemer ore in this country. He submitted a table to show that the present tariff, with the ocean freight added, gave to Bessemer iron ore a total protection equal to 170 per cent. ad valorem; to spiegelisen ore, 110 per cent.; to Bessemer pig iron, 70 per cent., and to 20 per cent. spiegelisen, 35 per cent. Apart from the question of iron ore was that of manganese ore, an article of absolute necessity in the manufacture of Bessemer steel. There were no known deposits in this country of suitable ore, in quantity, and the very small quantity of spiegel now manufactured here was smelted chiefly from foreign ores. The removal of the duty on the ore could do no harm to anybody, and might encourage the transfer of the manufacture of spiegelisen from Europe to this country. At present the importation of spiegelisen was about 150,000 tons a year.

At the sitting on Tuesday Mr. J. B. Sargent, of the firm of Sargent & Co., made an argument in advocacy of the principles of free trade. He said that an active business experience of nearly 40 years, 30 of which had been occupied in manufacturing, and a fair acquaintance with and knowledge of the natural resources of this country and of most of the countries of Europe, with an examination and comparison of the methods, facilities, advantages and disadvantages of American and European manufacturers, had convinced him that the United States was fully capable of taking and maintaining an independent position as a manufacturing nation; and that her manufacturers, if left to fight their own battles against all comers in a free-trade field, needed no protection whatever against foreign manufacturers. The fact that they were now able to sell to some little extent their manufactured goods in neutral countries against the competition of European manufactures was evidence of what they might do if relieved of the incubus of an enormous customs tax on the foreign raw materials used here, and the correspondingly high price of American raw materials. The tariff figures had climbed upward, a step here and a step there, until a tariff wall had been built that not only kept nearly all foreign raw materials and manufactured goods out of the country, but kept nearly all American manufactured goods at home, and so circumscribed the market, dwarfed American commerce, and suppressed nearly all possible material for commerce except the products of the soil. By combination and division of business among the producers of pig iron, bar iron, steel and other metal products; by lockouts and fermentations of protracted strikes, and by the help of a tariff of from 50 to 250 per cent., all the metals and the immediate products of metals that were produced in this country were nearly twice as high here as in Europe. How, then, could it be expected that American manufacturers should be able to sell their products in foreign countries, when their raw materials cost so much more than their English and German competitors pay for the same? To the end that manufacturers might be increased, that the demand for American raw materials might be increased, and that labor might be fully employed and the cost of subsistence of all classes reduced, he asked the commission to recommend to Congress such an



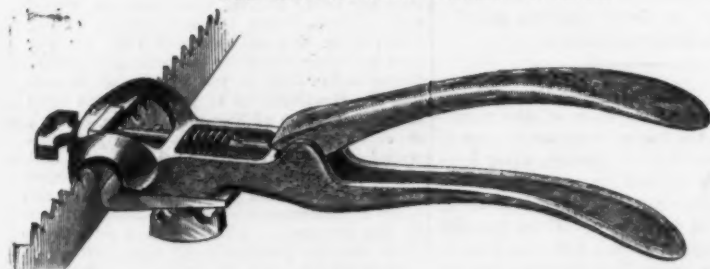
TRENTON LOCK & HARDWARE CO.
WORKS
AND
PRINCIPAL OFFICE:
TRENTON, N. J.
AGENCIES AND DEPOTS:
JAMES M. VANCE & CO.
211 Market St., Philadelphia.
JAMES MARSHALL.
48 Warren St., N. Y.
MANUFACTURERS OF LOCKS & HARDWARE.



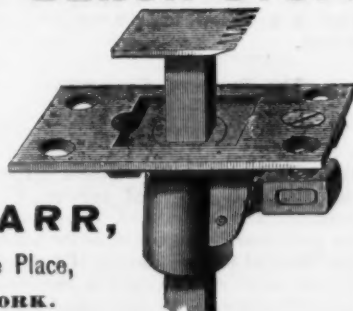
WITH PATENT ADJUSTABLE ATTACHMENT. The only Saw that can be adjusted for either a One-Man or a Two-Man Saw. We make the following lengths, 3½, 4, 4½, 5 feet. Send for sample.

WHEELER, MADDEN & CLEMSON MFG. CO., Middletown, N. Y.

MORRILL'S PERFECT SAW SETS AND BENCH STOP.
FOR SETTING EVERY VARIETY OF SAWS.

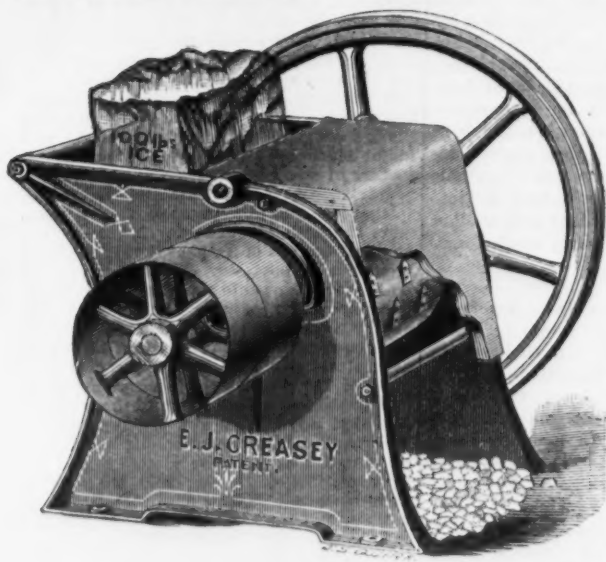


For price lists
and discounts
Address



ASA FARR,
64 College Place,
NEW YORK.

REKAERB ECI YESAERC



IN USE BY
**Meat & Fish
Packers,
ICE CREAM
MAKERS,
HOTELS,
CONFECTIONERS.**

Five Sizes, from \$5
to \$100.

Send for Circular to
J. S. L. WHARTON
15th & Wood Sts.,
Philadelphia, Pa.

WILMINGTON, DEL., April 17th, 1882.

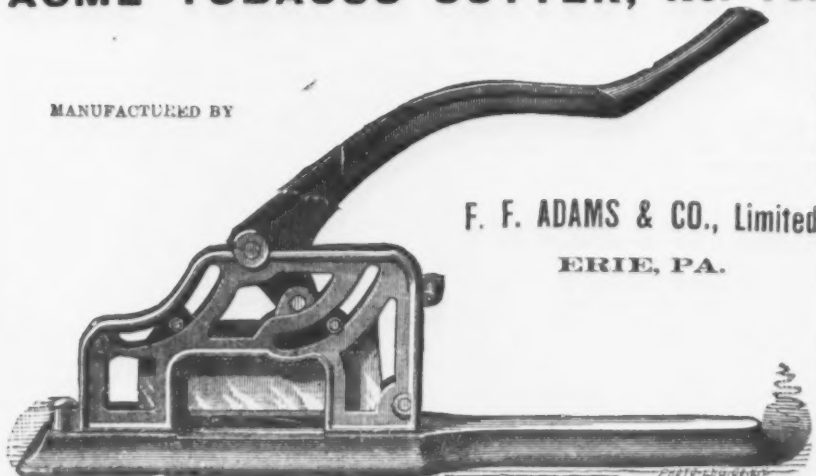
GENTLEMEN:—In regard to yours of March 29th, would say that in addition to the one bought of you in 1880 to run by hand, we bought one in 1881 to run by steam, and run through it 17 tons in less than two hours (No. A). We are now using both in different places, and like them very much. They are a much better machine for the purpose than any I have yet seen. Yours, truly,

JACOB PUSEY, Pres., Kennebec Ice and Coal Co.

SAVES ICE, TIME, MONEY.

ACME TOBACCO CUTTER, No. 10.

MANUFACTURED BY



F. F. ADAMS & CO., Limited
ERIE, PA.



**THE GATE CITY,
STONE WATER FILTER.**

A NATURAL POROUS STONE FILTER

Never Clogs or Chokes Up.

Does not absorb impurities in the water. Never becomes filthy and unfit for use. It easily cleaned.

IN ALL RESPECTS
THE BEST FILTER MADE.

Seven Sizes:
2½, 3, 4, 5, 8, 10, 20 Gallons.

MANUFACTURED BY

Sidney Shepard & Co.,

Proprietors of the

Buffalo Stamping Works,
Buffalo, N. Y., and Chicago, Ill.

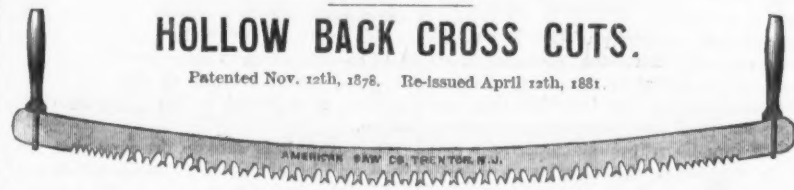
Please send for descriptive circular and prices.

AMERICAN SAW CO.

TRENTON, N. J.

HOLLOW BACK CROSS CUTS.

Patented Nov. 12th, 1878. Re-issued April 12th, 1881.



ONE-MAN SAW.

With Reversible Handle.



VULCAN SAW WORKS

VULCAN SAW WORKS.

HARVEY W. PEACE CO., Limited,

BROOKLYN, E. D.,

NEW YORK.

O. K. OIL TEMPER.

BAND SAWS.

ALL WIDTHS, FROM 1-8 TO 6 INCHES.

Our Band Saws are Unequaled in Quality.

**The Livingston
Horse Nail Company,**

95 READE and 113 CHAMBERS STREETS,

NEW YORK,

MAKE A SPECIALTY OF

CHEAP HORSE NAILS.

OWNERS OF THE BRANDS

BAY STATE,

Pointed and Polished,

EMPIRE,

Pointed and Bronzed,

HORSE NAILS.

HENLEY'S CHALLENGE ROLLER SKATE.

The Latest, and Best, and
Most Complete Scientific
SKATE

IN THE MARKET.

PATENTED

October 16, 1880,

AND

August 23, 1881



LIBERAL TERMS TO THE TRADE.

For Prices, Circulars and further particulars, address, mentioning *The Iron Age*.

M. C. HENLEY, Patentee and Manufacturer,
309 North Fourteenth Street, RICHMOND, IND.

Wyoming Shovel Works,
WYOMING, LUZERNE COUNTY, PA.

Patent Plain Back Solid Shovels and Spades, Back Strap Shovels,
Spades and Scoops.

RAILROAD AND MINERS' SHOVELS of Superior Quality a Specialty.

Send for Price List, &c.

PAYNE PETTEBONE & SON.

DUNNING FINISHED STEEL HORSE SHOES.

THE MOST POPULAR AND ECONOMICAL HORSE SHOE IN THE WORLD!

The Chicago Steel Horse Shoe Co.,

SOLE MANUFACTURERS,

30 West Lake Street, Chicago, Ill.

These shoes may be ordered in single or assorted sizes from the leading Hardware Houses East or West. Among whom are:

Simmons Hardware Co., St. Louis.
W. B. Belknap & Co., Louisville.
Nichols & Dean, St. Paul.
W. J. Holliday & Co., Indianapolis.
Michael T. Horner & Co., Baltimore.
Lewis Shillinger, Syracuse.
Geo. Tritsch, Denver.
Coombs & Co., Fort Wayne.
Locke, Hale & Co., San Francisco.
Pratt & Co., Elmira, N. Y.
Fowler & Sons, Buffalo, N. Y.

Dunning Sizes..... 4, 6, 8, 10.
Correspond with Iron Shoe, 2, 3, 4, 5.



EASTERN DEPARTMENT.

PECK & GODDARD,

SOLE AGENTS

FOR ALL STATES EAST OF OHIO,

60 Liberty St., New York

These shoes are forged from a solid bar of steel.

Afford a natural, even bearing for the foot.

They will cure corns and improve tender feet.

Being a finished shoe it only requires the work of shaping and nailing on.

Send for sample keg (100 lbs.) assorted sizes.

Illustrated catalogue sent on application.

The Only Perfect Horse Shoe Ever Put on the Market.

M. D. SHIPMAN.

S. M. STEVENS.

C. E. BRADT.

S. E. BRADT.

SAMSON WIRE STRETCHER

Patented Feb. 3, 1881, and Oct. 11, 1881.

For Sale by all Leading Jobbing Hardware Houses in the United States.



MANUFACTURED BY

Samson Novelty Works,

DE KALB, ILLS.

Send for Circulars and Price List, showing our liberal discounts to the Wholesale trade.

JOHN G. ROLLINS & CO. LIMITED

OF LONDON, ENGLAND.

Have Established an Agency at No. 14 Stone Street, New York.

This Agency invites correspondence from manufacturers of reputable goods of all classes suitable for exportation. Catalogues and Price Lists, accompanied by lowest quotations for Export, are solicited.

The Company, through its traveling and resident Agents abroad, will give especial attention to

INTRODUCING IN FOREIGN MARKETS AMERICAN GOODS OF KNOWN MERIT,

And manufacturers of such are invited to call at this Agency.

CLEVELAND BARB FENCE CO.,

39 & 41 CENTRE ST.

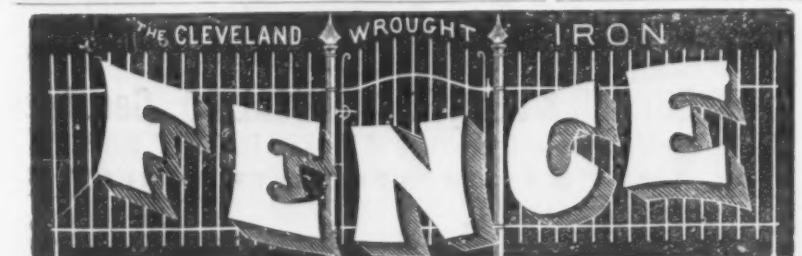
CLEVELAND,

OHIO.

LICENSED.

TWO & FOUR POINTED

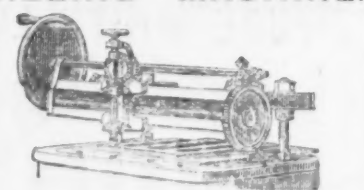
Barbed Wire Fencing.



Our specialty. Also, Castings, Flanges and Vases, Stable Fixtures, Hitching Posts, Door and Window Guards, Wrought-iron Gratings, Fire Escapes and Ladders, Jails, etc. Our Fencing can be shipped to any part of the United States, and can be set up by the purchaser at small expense. Our prices are reasonable. Correspondence and notice of public lettings of ironwork solicited. Every Hardware Dealer should have our Catalogue. Address: CLEVELAND WROUGHT IRON FENCE WORKS, CLEVELAND, OHIO. Office, 31 Water Street, near Union Depot, CLEVELAND, OHIO.

BRIDGE RIVETS. STANDARD RIVET CO., CLEVELAND, OHIO.

STEAM CHEST SEAT MILLING MACHINE.



L. B. Flanders Machine Works,
No. 1025 Hamilton St., Philadelphia, Pa.

Mellert Foundry & Machine Co.,
Limited.

(Works Established at Reading, Pa., in 1858.)
Manufacturers of

CAST IRON WATER & GAS PIPE
Specials, Flange Pipe, Retorts, Valves and Hydrants,
Lump Pumps, etc. The Improved Canadian Turbine Water Wheel, Machinery and Castings for Furnaces, Rolling Mills, Grist and Saw Mills, Milling Pumps, Hoists, etc. Columns, Brackets, Iron Railings, etc.

General Office at READING, PA.

DON'T BUILD A HOUSE
Of any kind until you write for Prices and Samples to the
BODINE ROOFING CO.,
Mansfield, Ohio.

amendment of the tariff laws as that (except in regard to articles which pay an excise or internal-revenue tax) nothing shall pay a duty of over 25 per cent. (from which duty the cost of freight should be deducted).

Until the cost of raw materials and manufactured goods in the United States could be reduced, all attempts to build up a respectable United States marine would be futile. Under existing circumstances it was folly to talk of steamship lines between the United States and Australia, South America or any other purely agricultural country. Even if the steamships could be bought in Europe, the United States could not furnish outward cargoes of manufactured goods. Europe would have to furnish the outward cargo for exchange for the wools, hides, woods, gums, coffee and other agricultural products of those countries, bring to the United States so much of those products as were needed here, and take back American agricultural produce for Europe. Very few American manufactured goods enter into this commerce, and the few that did so had to go via Europe. The starting point in the circular or triangular trip had to be the free-trade or low-tariff country, which could furnish the manufactured goods at the requisite price.

At this point Mr. Sargent was cross-examined by Mr. Kenner.

Mr. Kenner—Has there been any time since you commenced manufacturing that you had not more or less tariff protection?

Mr. Sargent—We have had it almost all the time.

Mr. Kenner—Would you have attained the excellence in your products that you have attained so as to be able to ship your goods to Europe if you had not had protection when you first started?

Mr. Sargent—I am inclined to think we could. I am of the opinion that without the tariff we should have begun to export earlier than we did.

Mr. Kenner—That is, you would have prospered more without the tariff than with it?

Mr. Sargent—I think so, with free trade on the raw material at the same time. Some articles can be manufactured in almost every country cheaper than they can be in any other country. The manufacture of pottery in New Jersey can be carried on to better advantage than in most countries where the raw material is not so easily obtained, and where the fuel is higher in price. The manufactures of the South need protection, if they need any at all, not against the manufactures of Europe, but against the manufactures of the North.

A long examination here took place as to the relative housing, clothing and food of the foreign and American working classes, Mr. Sargent taking the ground generally that they were as good abroad as in the United States. He thought Western manufacturers would share equally in the benefit of the leveling rate of 25 per cent. he would make on everything of whatever nature that is now taxed at that rate or higher. Hardware manufacturers in the West would be more benefited by low-priced raw materials than we would be. He did not think there would be an interval of great trouble in consequence of the reduction of wages. He thought the immediate effect of a reduction from where the duties are now down to 25 per cent. would be to take off the profits of the manufacturers to some extent, and gradually, as the price of living was reduced, the price of labor would be reduced. That would be no disadvantage to labor, and would be of vast benefit to the great consuming classes in the country, the farmer, the clerk, the professional man, the capitalist and the widow and orphans having fixed incomes. The reduction of wages would, therefore, be only nominal.

Mr. Oliver inquired whether the high wages of this country had not necessitated the creation of improved machinery.

Mr. Sargent admitted that to be the case.

Mr. Oliver—If our labor had been as cheap as the English and German labor, would this improved machinery have been invented and created?

Mr. Sargent—I think it would. The competition is not only with Europe, but with ourselves. Every manufacturer always tries to improve his machinery.

Mr. Ambler—Is the laborer in Europe as well off as the laborer here?

Mr. Sargent—He certainly does not live in all respects so well as the workingman in this country does, but merely in respects that are not called, there or here, really essential.

Mr. Ambler—That is to say the European laborer has less luxuries than the American.

Mr. Sargent—Yes, perhaps he has.

Mr. Ambler—Do you think that the luxuries of the American laborer should be cut down?

Mr. Sargent—I do not think it desirable that they should be. I desire to keep the workingman here in as good condition as possible. It is not due to the protective tariff that wages here are higher than in Europe, but it is due to our cheap and prolific soil, and to the fact that this country does not take the tillers of the soil and convert them into a standing army. We are apt to think that the workingman's wages in this country are governed entirely by the tariff. I think that the tariff has nothing to do with it. In my opinion the agricultural laborer should not be taxed in any way in order to support at a higher rate of wages the laborer in the factory.

Mr. Ambler—Undoubtedly he should not.

Mr. Sargent—A point which I have not mentioned as to the desirability of free trade is the importance of having a variety of foreign markets. If a manufacturer has but two customers and loses one of them, his outlet is only half as great. The manufacturer whose market is confined to this country finds himself in times of panic or depression without any customer, but if he has foreign markets then he can fall back upon them.

Mr. James M. Constable, of the firm of Arnold & Constable, next addressed the commission, and while suggesting a certain scale of rates, said generally that if he himself had the making of a tariff he would put all raw materials on the free list, and all manufactures at 25 per cent.

Mr. John H. Brewer, member of Congress from the Trenton district of New Jersey, read an argument in the interest of American potteries, and as to the necessity of pro-

tecting that industry as much as the most favored industry is protected.

Mr. James M. Shanahan, of Great Jones street, New York, importer of dry goods, made a statement corroborating the general views expressed by Mr. Constable.

The commission adjourned to meet in Boston Thursday, August 24.

Iron Fishery Steamer.

At Pusey & Jones' shipyard, in Wilmington, a few days ago, we had the pleasure of examining the iron steamer Albatross, building for the United States Fishery Commission. Under the guidance of Mr. G. W. Baird, U. S. N., who has the entire work under his direct supervision, we were shown through the interior of the hull, which rises on the stocks to a point about in line with the roofs of adjacent buildings. In ascending the stage alongside, an unusual feature is a projecting flange at the turn of the bridge, extending, perhaps, two-thirds of the length of the vessel, to steady her motion through the water, or rather, counteract the rolling motion. The dimensions of the Albatross, which has iron twin screws and compound engines, are as follows: Length, 200 feet; breadth, 16.9; beam, 27.6. There is a pair of engines for each screw, with high pressure cylinders 18 inches in diameter and low 34 inches; pistons, 30 inches stroke. Her plates vary from 3/4 to 5/8 inches. The keel is a bar 8 x 2 1/2; the two bilge keels are 16 inches deep, 80 feet long, 7/8 thick, between 4 x 6 angle iron. The stern post is 7 1/2 x 2 1/2 inches; the stem is 7 1/2 x 2 1/4. The frames are 4 x 3 x 7-16, spaced 21 inches; the reverse bars are 3 x 3 x 3/4 on every frame, and extending alternately to the stringer plate and to 12 inches above the turn of the bilge. The center keelson, on top of reverse bars, is 12 x 4 1/2 x 3/4, and 8 feet 8 inches from that, on each side, are channel bar keelsons, 6 x 3 1/2 x 7-16; the intercostal plates are 3/4, connected with 2 1/2 angle irons. The deck beams are 7 x 3 1/2 x 7-16, spaced on alternate frames. The screws are 9 feet in diameter, 14 feet 10 inches mean pitch, 26 inches long on line of their axis and have four blades. The boilers are two in number, of the return flue kind, with water legs. They are 8 feet 6 inches front, 8 feet 6 inches diameter of waist, 21 feet 6 inches in length. Each boiler has two furnaces, and the aggregate grate surface (both boilers) is about 100 square feet.

Special attention has been given to the ventilating apparatus, which comprises a No. 6 Sturtevant exhaust, the fan suction being connected with every part of the vessel, with a register cap at every opening. The steering gear is also worthy of remark, this part of the mechanism being known as a "steam quartermaster," consisting principally of three half trunk oscillating engines set at angles of 60°, and all working on the same crank-pin. Connected with it are various automatic motions, besides which is a variety of appliances, such as distillers, improved windlasses, electric lights, laboratories, sounding machines for great depths, dredges, screws, etc. The trawl is made of chain, and will be cast into the sea attached to a steel wire 3/4-inch in diameter and 800 fathoms, or over nine miles in length. The sounding apparatus is designed for even greater depths, and will automatically record temperatures at every 100 feet, ascending or descending. The vessel will take out a corps of meteorologists and scientists, designated by sea-faring people "scientific sharps." The Albatross will soon be finished, ready to attend the London Fisheries Exhibition.

The Cambria Iron and Steel Works.

The following particulars concerning the works of the Cambria Iron and Steel Company, at Johnstown, Pa., may prove interesting: In addition to the interest recently purchased by the Lake Superior iron mines, the company own 50,000 acres of land in other places, some of which over 23,000 acres being in Cambria County. Besides 500 coke ovens of the beehive type in the Connellsville region, the company have put up 120 Belgian ovens at Johnstown and make their own coke. The works comprise 13 blast furnaces, 2 of which yield a weekly output of 800 tons of pig iron, a Bessemer plant with two 6 1/2-ton converters, and two open-hearth Pernot furnaces, having a capacity of 36 tons each per day. Thirty-five miles of railway connect the different parts of the establishment, and employ to large engines and 10 little engines for yard service. Their capacity is as follows:

	Tons.
Pig metal.....	250,000
Coke.....	300,000
Steel ingots.....	175,000
Steel rails.....	125,000
Puddle bar.....	35,000
Iron rails.....	3,000
Rail fastenings.....	5,000
Iron and steel in other shapes.....	50,000

In order to produce this immense output, the works consume:

	Tons.
Iron ore (mined and purchased).....	450,000
Coal (mined by the Cambria Iron Co.).....	775,000
Limestone (mined by Cambria Iron Co.).....	425,000

Total annual consumption..... 1,650,000

The number of men employed is almost 8000, and, although these are paid largely by order on the company store, the cash paid out by the company averages \$120,000 per month throughout the year. The plant is valued at \$7,000,000. The company have a capital stock of \$3,000,000, and a surplus fund is now rapidly accumulating.

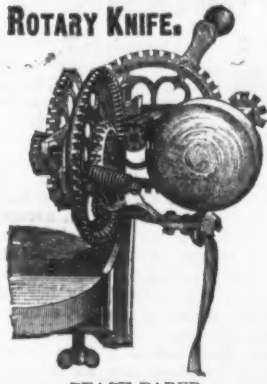
According to the Oesterreichische Zeitung für Bergund Hüttenwesen, a rich oil measure has been discovered at Pechelbrunn, in Elsass, at a depth of from 450 to 500 feet. Numerous borings have been made; the last one, 21 1/2 inches diameter, struck the oil-shale at 475 feet depth, and yielded from eight to ten barrels per hour. The oil has a specific gravity of .85.

It is said that a scheme for lighting the port and harbor of Bilbao, Spain, is now awaiting the sanction of the authorities. It provides for the establishment of 40 lights, each of 2000-candle power, supplied by two engines, and the work of construction is calculated to cost about \$15,000, while the annual cost of maintenance is not expected to exceed \$2000.

SCOTT MANUFACTURING CO.,

BALTIMORE, MD.,
SOLE PATENTEES AND MANUFACTURERS.

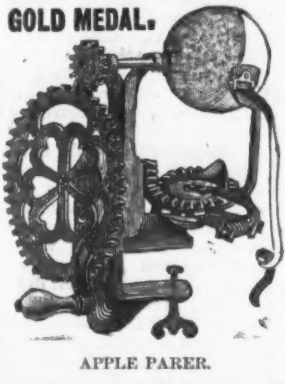
ROTARY KNIFE.



PEACH PARER.
The drawing cut of the revolving knife is the only known principle for a machine to pare peaches successfully. The Machine has little in common with ordinary parers.

THE
ONLY PEACH
PARER.
—
THE
BEST APPLE
PARER.

GOLD MEDAL.



APPLE PARER.
Enlarged and improved. Is the only successful Parer with a quick return movement of the knife. All the wheels have square holes and shafts with square ends, so they can not work loose.



UNIVERSAL CAN OPENER.
SOLID CAST-STEEL SHANK AND KNIFE.
Adjustable to cans of any shape and size. Also,
Patent Pea Sorting Machines For Packers Use
Patent Peach Pitting Machines
Also Manufacturers of Medallion and Victoria Egg Beaters.

THE TURNER & SEYMOUR MFG. CO.,

WOLCOTTVILLE, CONN.,
Manufacturers of

The "AMERICAN" and CLIPPER SHEARS, Celebrated FAMILY EGG BEATER, JUDD'S and other SHADE FIXTURES, PICTURE NAILS, and a large line of UPHOLSTERERS' and FANCY HARDWARE and METAL NOTIONS.



No. 14.
DESSERT SET.

HOLIDAY GOODS.

We desire to call special attention to our line of
Nickel Plated Nut Picks, Nut Crackers and Fruit Knives.

They are fine in appearance, durable and very cheap. They are put up in sets in handsome imitation Morocco boxes, or any of the articles alone in common boxes.

We also have a fine line of
Nickel Plated Scissors,
and many other goods suitable for Holiday trade.
Price Lists and discounts furnished the trade on application.

FIRE SAND AND CLAYS.

MOLDING SAND AND FOUNDRY FACINGS.

OUR STOVE PLATE FACING IS INDORSED BY THE LEADING STOVE FOUNDERS
Read the Following Testimonial:

Office of FULLER, WARREN & CO.,
Troy, N. Y., February 21st, 1882.

To Whom it May Concern:

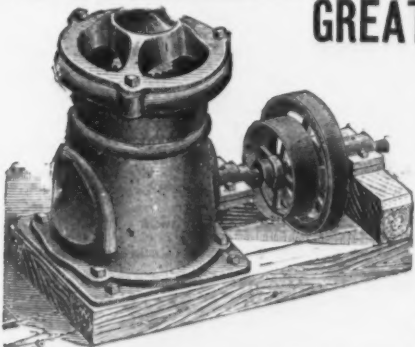
We have during the past four months used about 75 barrels of the "WHITEHEAD STOVE PLATE FACING," and find it the best and most economical that we have ever had in our Works, and shall continue to use it while supplied with the present quality. This Facing is manufactured by the AMERICAN FACING CO., 515 West 15th Street, New York City.

A. H. EATON, Superintendent.

SHOVELS, RIDDLERS, BRUSHES, &C.

WHITEHEAD BROS.
AMERICAN FACING CO.
515 and 517 West 15th St., New York.

WM. WHITEHEAD, Treas.,
517 W. 15th St.,
New York.



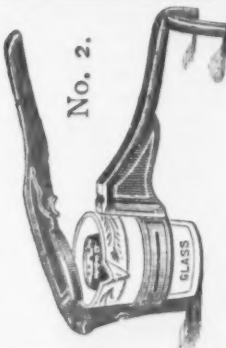
GREATEST ROCK BREAKER ON EARTH.

CAPACITY 1 TON A MINUTE.
DON'T FORGET IT!
Guaranteed to do Double the Work of any other or Money Refunded.

SEND FOR CIRCULARS.

Engines, Boilers, Stamp Mills and Mining Machinery.

GATES IRON WORKS,
52 Canal St., Chicago.



THE DEAN LEMON SQUEEZERS.

(Patented Feb. 7, 1882.)
SOLD TO JOBBERS ONLY.

Price List—Dis. 40%
No. 1.....\$15 per doz. | No. 2.....\$9 per doz.
No. 3.....\$5.50 per doz.

When the Squeezers cannot be obtained from the Jobbers, send orders direct. Samples sent for \$1.50. Mention this paper.

WM. B. DEAN, 43 Murray St., N. Y.

A. B. DEMING, Traveling Agent for Jobbing Trade.

WM. THOMSON & CO., Toronto, Sole Ag'ts for Canada.

Letters Patent of the United States were issued to Wm. B. Dean for improvements in Lemon Squeezers, consisting among others in supplying them with legs and with a removable juice cup held in a frame. Now this is to notify all persons making, vending or using Lemon Squeezers with the said improvements, or either of them, that I will hold them responsible in damages for infringement of the said Patent.

WM. B. DEAN, 43 Murray St., N. Y.

S. CHENEY & SON
MANLIUS, N. Y.,
MANUFACTURERS OF LIGHT AND MEDIUM WEIGHT

GRAY IRON CASTINGS,

METAL PATTERN MAKERS AND JAPANNERS
Correspondence solicited.

John T. Lewis & Bros.
No. 231 South Front St.,
PHILADELPHIA.



Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS.
Brooklyn White Lead Co.



White Lead, Red Lead & Litharge.
No. 182 Front Street,
NEW YORK.

JOHN JEWETT & SONS,
Manufacturers of the well-known brand of
WHITE LEAD.



ALSO MANUFACTURERS OF
LINSEED OIL.
181 Front Street, NEW YORK.



The Atlantic White Lead and
Linseed Oil Co.,
Manufacturers of

White Lead (Atlantic), Red Lead, Litharge, Glass Makers' Litharge and Orange Mineral;

LINSEED OIL,
Raw, Refined and Bled.

ROBERT COLGATE & CO.,
257 Pearl St., NEW YORK.

SALEM LEAD COMPANY,
CORRODERS AND MANUFACTURERS OF
PURE WHITE LEAD.



ALSO MANUFACTURERS OF
Lead Pipe and Narrow Sheet Lead.
F. A. BROWN, Treas. SALEM, MASS.

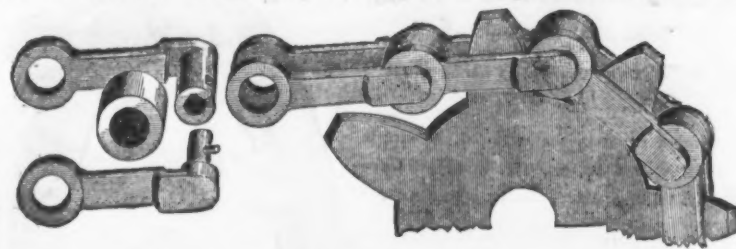
H.B. SMITH MACHINE CO.,
925 MARKET ST.,
PHILADELPHIA.
CELEBRATED
WOOD WORKING
MACHINERY

For Car Shops, Planing Mills, &c.
Also Machinery for all purposes. Correspond with us

A LONG NEEDED WANT SUPPLIED.

CHAIN BELTING FOR TRANSMITTING POWER.

The Lechner Anti-Friction Roller Detachable Chain.



MADE OF STEEL OR MALLEABLE IRON.



Is a substitute for Leather Belting and Cog Gear Wheels. Has GREAT STRENGTH and durability. Positive motion, no slipping. Can be run at almost any desired speed. Is especially adapted for running Heavy Shafting, Elevators, Hoists, Drags, Nut Coal Elevators and Screens, Agricultural Machinery, Roller Trains in Rolling and Rail Mills, Dredging and Ditching Machines, Lifting Cranes, Saw-Dust and Tanbark Carriers &c. Manufactured and sold by

THE LECHNER MANUFACTURING CO.,

J. A. JEFFREY, President.

COLUMBUS, OHIO.

JUST OUT!

Anchor Lock Faucet.

MANUFACTURED ONLY BY

PENFIELD BLOCK CO., Lockport, N.Y.



Patent Applied For.

Lock Faucets are made of the best material; the body being of cherry and the metal parts of a composition that is compounded especially to prevent corrosion when in contact with acids contained in light liquids. The Spigot Base is leather-lined. The Key is Malleable Iron. Tinned. The essential part is a combination of the most valuable improvements of the two faucet it is to be the most perfect Lock Faucet in the market. The wear of the spigot can be taken up by tightening the cap at the end; it being screwed into the wood.

HENRY B. NEWHALL,
105 Chambers Street,
NEW YORK AGENT.

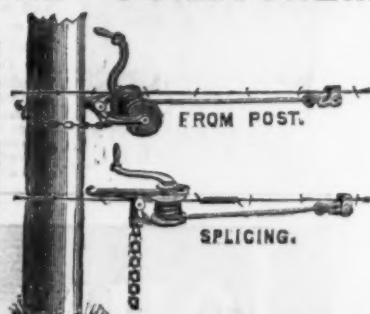
S. H. & E. Y. MOORE,
163 & 165 Lake Street,
CHICAGO AGENTS.

Sample Orders Solicited.

LITTLE GIANT WIRE STRETCHER.

READ.

This is the only Stretcher made with a SELF-ADJUSTING SLOTTED LATCH that will adjust itself to the RATCHET, either side of the post, or at either end of the wire, or either side up, the crank turning at all times in one direction, which is necessary, for reversing the crank would reverse the rope. Stretches so constructed that the latch will drop down, except when in a certain position, are well nigh, yes, quite worthless.
Hook the eccentric at the end of the rope to the wire, now wind up and a little child can break any wire ever made. For splicing wire, place one end of the wire under the Ho eccentric on the frame, and the other end to lip eccentric at end of rope; now draw them together and splice. For raising hogs, cattle or any other weight it is indispensable. It is far superior to a hook fastened to one side of the post as, when the ground is wet, the strain being on one side, has a tendency to loosen and turn the post. This Stretcher BEING FASTENED TO THE POST, it is not necessary for one man to HOLD IT UP while another operates it, and follows it en route to the post. One man standing at the post operates the LITTLE GIANT alone, and very easily.



Price \$1.50 Each. Discount to the Trade.

ABRAM ELLWOOD, Sole Manufacturer, SYCAMORE, ILL.

DROP FORGINGS OF EVERY DESCRIPTION.

AGRICULTURAL IMPLEMENT AND
MISCELLANEOUS FORGINGS A SPECIALTY
Superior Work at Reasonable Prices.

* ESTIMATES * FURNISHED *
CHICAGO STEEL HORSE SHOE CO.
COMPANY'S WORKS
20 West Lake St.
CHICAGO.

The American Dynamo-Electric Machine,

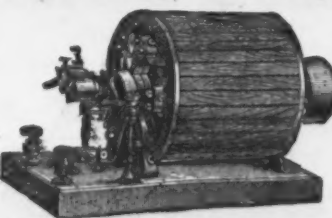
For Electro-Plating, Electrotyping, &c.

Requires no Water.

Combining
all the

Latest

Improvements.
Cannot Reverse
Current.



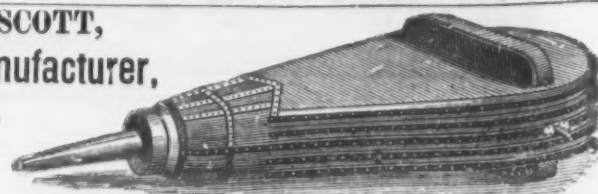
THE ZUCKER & LEVETT CHEMICAL CO., Gen. Agents,
Manufacturers and Importers of NICKEL PLATERS' SUPPLIES.

540 542 544 & 546 WEST 16TH STREET, N. Y.

GEO. M. SCOTT,

Bellows Manufacturer,

Johnson Street,
Cor. 224 St.,
CHICAGO, ILL.



RIVETS

C. F. HARRISON,
BOILER, BRIDGE & TANK
CUYAHOGA FALLS, OHIO.

RIVETS

WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., August 23, 1882.

THE LABOR PROBLEM.

Since the adjournment of Congress Senator Blair, of New Hampshire, Chairman of the Committee on Education and Labor, to which was entrusted the inquiry into the causes of strikes, condition of labor, &c., has remained in the city perfecting his plans for the carrying out of the objects of the bill in question. During this time he has been interviewed by the president of the Federation of Labor Unions of Washington City as to what his plans will be. These were set forth in this correspondence last week. This gentleman's conversation, however, related more particularly to the prospect of favorable action by Congress, and as to the course wisest to be pursued by the labor element throughout the country pending this inquiry. A circular to labor organizations, the results of this interview, which were simply casual, have been regarded as worthy of general circulation among labor societies, and with that view a circular has just been issued setting forth the matters referred to. The circular is addressed to T. V. Powderly, Chairman Executive Board of Knights of Labor, Scranton, Pa.; Richard Powers, Chairman of Legislative Committee, Federation of Organized Trade and Labor Union, Chicago, Ill.; John Jarrett, President Amalgamated Association of Iron and Steel Workers, Pittsburgh, Pa.; P. J. Maguire, Secretary of Brotherhood of Carpenters and Joiners, New York City; P. M. Arthur, C. E., Brotherhood of Locomotive Engineers, Cleveland, Ohio; B. T. Allen, Brotherhood of Locomotive Firemen, Louisville, Ky.; A. Strasser, President International Union of Cigar Makers, New York City; H. Henneberry, President Coopers' International Union, Cleveland, Ohio; J. B. Dyer, Secretary Granite Cutters' International Union, Boston, Mass.; P. F. Fitzpatrick, President Iron Molders' National Union, Cincinnati, Ohio; Henry Cole, President Bricklayers' National Union, New York City; George Clark, President International Typographical Union, St. Louis Mo., and all other representatives of labor organizations.

WHAT SENATOR BLAIR SAID.

It then proceeds: GENTLEMEN: I casually met to-day the Hon. Henry W. Blair, chairman of the committee on education and labor of the Senate of the United States, to which committee, as you are aware, has been referred the most important question of the day—the solution of the "labor problem." The distinguished Senator imparted to me (as president of the Federation of Labor Unions in this city) some very important information, and requested that I should convey the substance thereof to leading members of the most numerically powerful labor organizations throughout the union, as the facilities for direct communication with those bodies by the committee have not been perfected as yet. The Senator expressed the opinion that the plan heretofore presented by the Washington city branch of the Federation of Labor, namely, a central committee of representative workmen from all sections of the union at the capital, with a duly authenticated sub-committee or directory, will prove to be the most practicable method of obtaining information relative to the present condition of the working-classes and their grievances, the causes of labor strikes, and practical suggestions as to what will tend to the improvement of their social condition.

Senator Blair remarked also that a portion of the public press is doing great injustice to the Senate committee by intimating that the members thereof are unmindful of the great importance of the vital questions submitted to them for investigation, insinuating that they have turned the affair into a "junketing party at the seashore." This erroneous impression, said the Senator, perhaps grew out of the fact that a sub-committee, consisting of Senators Aldrich, of Rhode Island, and Miller, of New York, had been assigned to the investigation of certain questions included in the resolution (relative to wages in this country as compared with similar classes abroad), which questions can only be answered by reference to statistics embraced in the recently prepared census reports, and Mr. Aldrich chose for his own convenience and comfort to perform such tedious labors near his residence in Rhode Island during the recess of Congress. The chairman protested that in no sense would the committee be a "junketing party" that all the members would be industriously employed in a solution of the great questions referred to them by the Senate, and doubtless they would feel thankful to citizens interested in the subject for any light that will aid them in their investigations. It will be their aim to fairly adjust the relations between capitalists and laborers, not hurriedly, but with due deliberation. He therefore hoped that both capitalists and laborers will select representative men, in whose judgment and integrity they can place implicit reliance, and that both parties will do the committee the justice to believe they will act honestly and fairly according to their judgments.

I did not make written notes of the conversation, which occurred on the street, but the above is substantially its purport.

A CESSATION OF STRIKES TO AWAIT DEVELOPMENTS.

In transmitting the foregoing information at the request of the honorable chairman of a committee designated by the supreme power (the law-making power) of the land, to arbitrate between aggressive capitalists and comparatively defenseless laborers, I cannot resist the opportunity to say, as a co-laborer, of the earnest and devoted men to whom this communication is respectfully addressed, that I think it would be a wise policy at this juncture to advise all workmen now "on strike," who rely on financial aid from the scanty store of their fellow-laborers, to resume work at an early day, at least before winter, with increased expenses set in, upon the best terms obtainable from their late employers, and continue to work with as much patience as they can command, until they see what Congress will do in the matter next winter. If it should transpire in this legislative inquiry that the industrial classes

are being juggled with by knavish tools of unscrupulous power (which I will not believe until it is clearly proved), a national strike could be inaugurated within 30 days after the adjournment of Congress next March, by the unified labor organizations of the United States, with tenfold more effect than the recent strikes of 150,000 men. If the siege is raised and hostilities cease for the winter, the funds now devoted to sustaining strikes may be more effectively applied to the economical maintenance of a central committee of vigilant and active workers at the capital, in collecting and preparing statistics to sustain our case before Congress.

I disclaim any authority from any body of men for the suggestion contained in the above paragraph, but submit it as my individual view of the present situation.

THE ISSUE SHIFTED UPON CONGRESS.

Judging from private advices received here, the suggestions contained in the above circular will be generally acceded to by striking workmen. There is apparently a general disposition to give Congress a chance to do something, or at any rate to show its hand. Senator Blair seems to appreciate the delicacy of the situation in the unexpected turn that the labor question has taken. It would now seem that unless Congress does something to promote the interests of labor, that there will be more determined action on the part of the working classes than ever before. At all events, Senator Blair looks at it in that way, and is more determined than ever in his efforts to effect something. It now rests with Congress to unravel this intricate problem, or the danger is that an uprising of the working classes will follow, and such as has never been known before in the history of this or any other country.

THE LOCOMOTIVE TIRE CASE.

Prior to his departure from the city the Secretary of the Treasury began the consideration of the application of the importers for a lower rate of duty on steel locomotive tires than was accorded by the interpretation of the customs' law by the collector at Chicago. The tariff schedules specifically provide for a duty of 3 cents per pound upon locomotive tires or parts thereof. There is also a provision making all manufactures of steel, or of which steel shall be a component part, not otherwise provided for, dutiable at 45 per cent. ad valorem; but all articles of steel partially manufactured, or of which steel shall be a component part, not otherwise provided for, shall pay the same rate of duty as if wholly manufactured. The locomotive tires in question are steel, but only partially finished. The importers, it appears, appeal from the ruling of the collector that it is a manufacture of steel and therefore dutiable at 45 per cent. ad valorem, and claim that the articles are dutiable as "steel in any form not otherwise provided for" or at 30 per cent. ad valorem. The probabilities are that the decision will place locomotive tires in the same category as iron forgings for car axles. It will be remembered that these were not finished, and still they were rated as "axles or parts of axles." Should this be the ruling in the case of locomotive tires, the articles in dispute being "locomotive tires or parts of tires," the duty will be 3 cents per pound. The whole question, it appears, resolves itself into this. The inference is that locomotive tires are provided for unless they could be included under the provision for articles of steel partially manufactured. It is understood that the Secretary will announce his decision shortly after his return.

IRON FORGINGS FOR CAR AXLES.

The following is the text of the letter to the Collector at Toledo in the Iron Forgings for Car Axle case, the decision in which has already been announced in this correspondence:

TREASURY DEPARTMENT, July 17, 1882.

SIR: The Department has considered the appeal (95809) of James W. Ross from your decision assessing duty at the rate of 2½ cents per pound on 129,220 pounds of forgings for car axles, as "axles or parts of axles," transmitted with your letter of the 21st of February, 1882. In regard thereto, I have to state that the Secretary decides to deny the appeal in this case, and to sustain your assessment of duty at the rate of 2½ cents per pound. Your assessment of duty as made is therefore affirmed.

Very respectfully,

H. F. FRENCH, Assistant Secretary. Collector of Customs, Toledo, Ohio. [This is a reversal of decision of June 17, 1881, Synopsis 4898].

THE AMBIGUITIES OF THE TARIFF.

The correspondent of *The Iron Age* has secured advance sheets of that portion of the statements made before the tariff commission as relates to the ambiguities of the tariff and submitted by Henry F. French, Assistant Secretary of the Treasury. The following is an abstract of that portion affecting iron and steel, with some allusions to the tariff question generally:

CONFLICTING DECISIONS.

After explaining the routine of appraising of importations, and making appeals, if the classification should be unsatisfactory to the Secretary, or if he is not clear, to the Solicitor or Attorney-Generals who determine between the points at issue, he said if the ruling of the collector be affirmed the classification stands, unless the importer brings suit within a certain time, and the case then goes to the court and jury. The judges in New York are, Judge French said, skillful, in other places not so experienced, and the result is often quite different upon the law and the facts in the different jurisdictions. In New Orleans we get one decision on the classification of an article claiming to be cotton ties. In New York or somewhere else we get a different decision. We had one case in New Orleans where a jury gave a verdict that the article claimed to be a manufactured article—a cotton tie—was hoop iron. In the course of three or four weeks another case precisely like it came up and was laid before the jury, and in the course of the discussion, if not before the case came on for trial, the court set aside the verdict of the first jury because they had not been correctly instructed in the law, and put both cases to the same jury, and they found the other way.

WAS IT IRON OR STEEL?

Judge French said you might think that the question whether an article is iron or steel might be settled without any great difficulty. Yet there was a lawsuit tried within a year in Boston, which occupied six weeks, with the ablest counsel that could be procured, and quite an array of them on each side. Notice was given to the iron and steel people at Pittsburgh, who came down in force to defend their view of the matter, which was that the article was steel, and all the experts who could be gathered together in the neighborhood of Boston, and I do not know but everywhere else, on the other side, were there, and swore that it was iron, and after great difficulty and many rulings by the court, which were excepted to, the jury decided that the article was iron.

THE DIFFICULTIES AS TO DUTIES ON STEEL.

The difficulties as to the duties on steel arise in this way: At the time the tariff on metals was enacted (in 1864 I believe) there was no steel, as I understand, that was not worth from 7 to 12 cents a pound. Those articles which I sometimes call *brevet steel*, like Bessemer steel and Martin-Siemens, were not extensively known at that time. The specific and ad valorem duties were, no doubt, intended to be similar, but the change in the value of steel makes them very unequal. At the present time crucible steel is worth 10 to 11 or perhaps 12 cents a pound, and Bessemer steel for rails is worth about 1½ cents a pound. You will be able without difficulty to so arrange the duties ad valorem or otherwise that there shall not be the inconsistencies that now exist. I think it is probable, as the general idea seems to run through the tariff, that about 35 per cent. ad valorem was the duty that was conceived to be proper when that tariff was framed upon steel. You will find the duties fixed in the present tariff on steel at from 2¼ to 3½ cents per pound.

THE DIFFERENCES OF VALUES.

When the law was passed it seemed to be the idea of the law makers that about 35 per cent. ad valorem would be the proper rate. That seemed to be the rate they put on; 35 to 45 per cent. was put on to manufactured articles. At that time gold was worth 200, so that that rate would really be 70 per cent. The duties were payable in gold and the goods were sold for currency. It is pretty hard to bring these facts together. Commissioner Oliver remarked that that makes a very great difference between specific and ad valorem duties.

CONTROVERSIES ON CLASSIFICATION.

But what I speak of particularly is that the price of steel has so greatly fallen since that time by the introduction of new methods of manufacture of steel, that the ad valorem duty on it is very little, while the specific duty remains very high. Controversy arises as to the classification under paragraph 117: "Steel in ingots, bars, coils, sheets and steel wire not less than ¼-inch in diameter, valued at 70¢ per lb. or less, 2½¢ per lb." If you put 35 per cent. on that, if steel was worth 7 cents a pound, you would not get anything very different from the specific duty; but you introduce steel worth only 1½ cents a pound and put 35 per cent. duty on that, and it pays very little duty, so that the controversy between the manufacturers and the importers—those who wish to protect the importation, and those who wish to get it in at a lower rate of duty—is upon the classification, whether as ingots, bars, coils, sheets, &c., or as manufactured steel at 45 per cent., or as "steel in any form not otherwise provided for," 35 per cent. ad valorem. (91,120.)

THE HOOP IRON QUESTION.

I now come to the hoop iron question. The present tariff is found in paragraphs 79 and 80, as follows: "All band, hoop and scroll iron from ½ to 6 inches wide, under ¼-inch in thickness, and not thinner than No. 20 wire gauge, 1½ cents per pound. All band, hoop and scroll iron thinner than No. 20 wire-gauge, 1¼ cents per pound." The question in regard to what are called cut hoops and cotton ties is whether they come under that classification or under the classification contained in paragraph 146, which is as follows: "Manufactures, articles, vessels and wares not otherwise provided for, of brass, iron, lead, pewter, tin, or other metal (except gold, silver, platinum, copper and steel), or of which either of these metals shall be the component material of chief value, 35 per cent. ad valorem." I think the duty is about three times as much by the classification of these articles as hoop iron as by their classification as a manufactured article.

RULED BOTH WAYS.

So controversies will exist until the matter is in some way made clear. The history of this hoop iron controversy is very instructive. I do not undertake to say whether the Treasury Department has ruled correctly or not. As we have ruled both ways, we must be correct in one or the other instance. I can talk about the two classes, the cut hoops and cotton ties, together, perhaps, conveniently. The cotton tie is a piece of hoop iron 11 feet long, I think, either with or without what is called a buckle riveted to one end. It is a straight piece of iron. Some of them come with a buckle riveted on, and the hoop is wrapped around the bale and the end tucked under the loop of the buckle, and that confines it. That kind of a cotton tie, as long ago as 1867 or 1868, by a verdict of a jury in New Orleans, I think, and by the acquiescence of the Treasury Department and everybody else, was classed as a manufacture of iron at 35 per cent. For some reason there was not much controversy in the matter up to about 10 years ago. Then the importers began to refine a little upon it. They found that really there was not any need of riveting that buckle on. It was just exactly as good loose, because they could confine both ends as well as one. So they strung the buckles on at one end and sent the hoops up in packages of 50 with 50 buckles, one on each. Afterward they found there was no use in stringing them on each, and they strung them together. Then the question came up whether these, not being riveted on and not coming under the old rule, should be classed as hoop iron. The hoop iron

people said they should pay the high rate of duty, and the cotton people insisted that the cotton ties were manufactured articles at 35 per cent. On the question of the cotton ties the department ruled, finally, that a cotton tie that had not a buckle riveted on it did not come under the old decision, which was a recognized authority; that it was hoop iron, and should bear the duty of hoop iron. And that decision stands as the decision of the department, but it stands on a very slippery foundation, because there are people who contend that a cotton tie is hoop iron, whether a buckle is on or not; others contend that it is a manufactured article. The buckle is used with it; it is merely wrapped around the bale and these ends bent under and it holds. How the question would be settled, if it ever could be settled by the verdict of a jury, I cannot undertake to say. Cut hoops are about 6 to 8 feet in length. They come in ordinarily with holes punched at one end for rivets, and they are put around the barrel, being made of the right length, and the rivet put through the hole. Some of them have holes at both ends, so as to make them shorter or longer, and all that is needed is to bend them around and put rivets in them. The department ruled in the first place that this was hoop iron, and should pay duty as such. The case was tried three times in New York (one case, I think, or a series of cases) between the same party and the Government. In one of them the verdict was rendered for the importer and the verdict was set aside; in the other the jury disagreed. In the third case the jury found for the importer that it was a manufactured article, subject to the 35 per cent. ad valorem duty. That was in 1878. The question did not loom up so large as it has since. It was examined and sent in the ordinary way to the Attorney-General to know whether he acquiesced in the views of the court and jury; whether that verdict should be acquiesced in or not; and it came back with his opinion that we had better acquiesce in the decision and call it a manufactured article, and that decision was published.

THE INCREASING IMPORTATION OF HOOPS.

The importation of this article of hoops was very large. The Standard Oil Company import a very large amount of them, but under the doubt existing there are not as many imported as if the matter were clear. When that decision was made they began to order an immense amount. As to the cotton ties, there are 30,000 tons of iron for cotton ties used in a year. It seems incredible, but it will give you a little idea how large the importation would be in cut hoops if the hoops were all imported for the oil companies and other uses.

THE RULING CHANGED TO PROTECT HOME MANUFACTURERS.

They sent out immense orders, and great pressure was brought to bear on the Treasury Department by the manufacturers, who said that they could not compete with the foreign manufacturers with the 35 per cent. ad valorem duty, and Secretary Sherman was induced, I think in 1880 (I have not the exact date), to change the ruling. He remitted the matter to the Attorney-General to examine the evidence that was on file in the trial at New York, who decided that he was not satisfied with the result of that verdict and that it was proper to reverse that decision. Mr. Sherman sent a communication to Congress, in which he said that he was reconsidering the question, and that if Congress did not legislate on the subject before a certain date, which he named, he should reverse the decision of 1878, and declare that cut hoops bore the duty of hoop iron. Congress did not legislate within the time stated, and the Secretary reversed the decision and fixed the duty on cut hoops as upon hoop iron, and we have many suits now pending upon the question.

LARGE REFUNDS.

But the persons who imported under the decision of 1878, and who had made enormous importations, came at once to the department and to Congress and said, "Why, we were misled by this decision of the department and have invested our money, and our merchandise is on the way. We are willing to pay the duty fixed by the department when we ordered the goods, but we are not willing to pay three times as large an amount, and will not do it." Congress listened to their complaints and passed an act that all importations of this character made after the decision of 1878, and of goods ordered to arrive before a certain date (I think prospective somewhat), should have their merchandise rated according to the decision of 1878, as a manufacture of iron, at 35 per cent., and the refund should be made to all who had overpaid that amount in adjustment of their importations of that article, and we made large refunds.

TO AVOID AMBIGUITY IN THE FUTURE.

I only state this in detail to show you how very important a little question of this kind becomes, and how, if it is possible, you will avoid, as to all these articles, any ambiguity or uncertainty in the future, and how important it is in general to take a course by which we shall avoid litigation and the necessity for special legislation to relieve parties from decisions that are, under the circumstances, onerous or unjust.

HOOPS NOW RATED AS HOOP IRON.

At the present time cut hoops come in at the rate of duty paid on hoop iron; but there is an appeal in every case, and suits are being multiplied; and by and by there will be a trial, and from the experience we have had, we cannot feel any assurance whatever that the present decision of the department, that the duty on hoop iron should be imposed upon cut hoops, will be sustained. We have never, I think, got a verdict for the Government on that question.

NOT MUCH RELIANCE ON JURIES.

Some people say that the New York juries favor the importer. But I do not think there is any more danger from New York juries than from juries in any other portion of the country. They always seem to think it is easier for the Government to bear a loss than for an individual to do so; that it is easier for a large corporation to bear a loss than for an individual; and all of us who have tried cases before a jury in which a corporation is a party, and where, for instance, a man has lost a limb and has

brought suit against them, always fear that the jury will go with the individual rather than with the corporation.

GENERAL COMMENTS.

Judge French then pointed out some of the incongruities and complications growing out of the provisions relating to certain articles made out of silk, or of which silk is the component material of chief value. He said that it was a matter of the utmost difficulty to find out in such case what is the component material of chief value.

The remarks of Judge French are quite exhaustive of the whole question of the tariff in all its ramifications, but we will confine our abstract to the tariff as it affects the iron interests. Upon this subject we will again refer to his able and concise elucidation of this important matter.

NEW PUBLICATIONS.

FIRE PROTECTION OF MILLS. By C. J. H. Woodbury, 196 pages. Size, 6 by 9½ inches; 42 illustrations. Published by Messrs. John Wiley & Sons, Cloth. Price, \$2.50.

To many readers the opening of the cover of this book will seem like the opening of a new science. Attention is called to a great many things which the ordinary manufacturer or mill owner has never for a moment considered. The organization of a fire brigade for a mill, the methods of practice, the rules which should govern the water supply for fire purposes, the apparatus used, the features of mill construction, and the danger arising from different forms of carelessness in watchmen, are treated of in a way showing not only a complete knowledge of the subject, but also developing the fact that mill owners in general, especially those having establishments of only moderate dimensions, know very little of the essentials for fire protection. Our readers are familiar with several portions of this book, notably those treating of automatic sprinklers, of fire doors and fire apparatus, copious extracts from these portions having been published in our columns. Chapters are given on the safe construction of mills, the stiffness of floors, and the strength of mill columns. In the latter, a vast amount of new and valuable matter is introduced. The last portion of this is based on experiments made by Mr. Woodbury and Prof. Lanza at Watertown, with mill columns of full size. These experiments were undertaken by the Boston Manufacturers' Mutual Fire Insurance Co., for the purpose of ascertaining the actual strength of full-sized columns, and thus deducing rules which shall be in accordance with facts. This work has long been looked for with interest among manufacturers, and but for the necessity of working up these experiments we think would have made its appearance some time ago, the greater portion of it having been completed. Mr. Woodbury's position in connection with the Mutual Companies has been such as to enable him to investigate with exceeding thoroughness all the conditions which go to make up a fire risk. Electric lighting in any man, even one not acquainted with electricity or electrical terms, can understand. We have not for a long time seen a work likely to be of such great interest to manufacturers of all classes as this, and though many of the rules and directions were written for wool and cotton mills, still the scope is so broad that no man, whether owning a mill or warehouse, can read the book without profit and instruction.

THE NATION'S OBLIGATIONS AND DUTY TO ITS DOMESTIC MANUFACTURERS. By S. W. Davenport.

We are in receipt of a copy of a pamphlet bearing the above name, the author of which is a member of a well-known firm of crockery dealers in Chambers street, this city. It is a protectionist's reply to some recent criticisms by a foreign importer. The pamphlet is addressed to the editor of the *Commercial Bulletin*, and reviews at some length a correspondence which had already been published in its columns, after which the author proceeds to set forth his views upon the subject of domestic manufactures, foreign importation, a protective tariff in connection with the pottery trade, and other allied questions. While addressed particularly to the pottery trade, it is quite readable for all who are interested in the general subject of protective duties. A supplement to the pamphlet refers particularly to the tariff on earthenware, the pottery industry, and the effect of domestic competition upon prices.

ARTISTIC HOMES IN CITY AND COUNTRY. By Albert W. Fuller, Architect. Oblong, 4 by 7 inches. 44 full-page illustrations with brief explanatory text. Published by James R. Osgood & Co. Price, \$3.50.

The reputation of Mr. Fuller as an architect would in itself be sufficient to give this work a wide circulation. Its intrinsic merits, however, will no doubt bring it to the attention of many who would otherwise never have heard of its author. The plates presented are the result of the general routine of his work during two years previous to the publication of the volume. The sketches from which the engravings were made are such as have been actually prepared for parties contemplating the erection of homes, and therefore possess a practical interest which mere studies for the sake of publication fail to show. The selection, as indicated by the title of the book, embraces houses adapted for both city and country. The drawings, for the most part, consist of perspective views of floor plans to scale and decorative details of interior finish and decoration. While the work has been intended more especially for architects and designers, it contains much that is of practical interest to the builder. Plate 12, entitled "The Old made New," is an example of what may be done in a house already erected that will be of interest to many people. A chapter on drainage and plumbing, which is incorporated in the book, will be of value to those who have not already given the subject of sanitary science careful attention. The work closes with drawings of a country church, such as would be suitable for erection in any well-to-do rural community. The materials of which it is built are brick and stone, and the estimated cost is about \$10,000.

It is stated that competent geologists have estimated the area of the coal fields of Arizona at over 30,000 square miles.

Special Notices.

1500

U. S. CAVALRY SABRES.

In excellent order.

Cutlery manufacturers can secure this desirable lot at a bargain, by addressing

"SABRES."

Box 3182, Boston.

For Sale.

Palo Alto Rolling Mills,

Near Pottsville, Pa.,

ON THE MAIN LINE OF THE POTTSVILLE AND READING RAILROAD.

These mills are in good repair, and can be started in two days' time. Rolls for T-Rails 12 to 20 lbs. per yard, and for Street Rails 15 to 20 lbs. per yard. Guide Mill Train for Merchant Iron 1/2 to 1 inch. Rolls for Merchant Bar, round and square, up to 4 1/2 inches. Number of Puddling Furnaces in both mills, 30; Heating Furnaces, 9; all with boilers attached. Also Foundry, Machine Shop, Blacksmith Shop, Iron House, Roll House, Carpenter and Pattern Shop, Stables, handsome Dwelling for Superintendent, 11 Tenement Houses, a Brick Office, and ample grounds for stock and cinder.

For further particulars address
Messrs. LEE & McCAMANT, Extrs.,
Pottsville, Pa.

THOS. F. WRIGHT, 184 Race St., Philadelphia, Pa.
HUGH W. ADAMS, 36 Pine St., New York.

Furnace Property

For Sale.

Will be sold at a low price. The Charter, Rights and Real Estate of the Bloomsburg Iron Co., together with such portions of the stock of materials and other personal property as purchasers may require. The real estate consists of two blast furnaces favorably known as the Ironside Furnaces, in good condition, steam engine, water power of 100 to 200 horse-power, lands with extensive iron mines, storehouse, numerous dwelling houses, R. R. tracks and sidings several miles in length (connecting the furnaces with both Canal and Railroad), canal wharves with tracks and facilities for receiving and shipping large quantities of freight with economy and dispatch, either by canal or railroad.

This property is situated at Bloomsburg, Pa., within 30 miles of the Wyoming Coal field. The furnaces have been in continuous and successful use for 25 years. The Company owns in addition extensive and valuable ore mines in Snyder Co., Pa.

All the property is in good order and now in profitable use. For further information apply to
CHAS. R. PAXTON, President,
Bloomsburg, Pa.

For Sale.

Stock of Hardware, Stores, Tinware and Farm Machinery. Value about \$6000. Located in Mt. Sterling, the county seat of Brown, Ill. Doing a business of \$20,000 a year. Business of 20 years standing. Only one other hardware store. Will sell store room and dwelling, if desired. Reason for selling, poor health. If applied for before store trade begins a bargain will be given. This is a rare chance.

Address, R. SMITH, Mt. Sterling, Ill.

40-Inch Lathe for Sale.

One 40 inch by 12 1/2 feet screw-cutting Hewes & Phillips Lathe. It has power cross feed, a heavy four-jawed chuck and raising blocks to swing 5 inches. Weight about 8000 lbs. Will be sold cheap. In apple pie order.

GEO. A. OHL & CO.,
East Newark, N. J.

Wanted

TO PURCHASE, 2 OR 3 GOOD PUNCHING AND SHEARING PRESSES,
One Large Steam Hammer and one 7-ton Crane.
Address, giving description and price,
M. P.,
P. O. Box 1148, Pittsburgh, Pa.

Wanted.

Traveling salesman, to sell the Crescent Steel Boiler Tube Scraper (the finest tool of its class in the market), on commission, to the trade only. State territory covered, with references.
Address, CRESCENT MFG. CO.,
305 Michigan St., Cleveland, O.

The Sherman Process Co.

9 Fomberton Square, Boston, Mass.,
Issue Licenses to use the Process for the Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens Martin, Puddling, Blast and Cupola Furnaces. The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working. See page 17 of The Iron Age of Oct. 25th, 1877.

\$5,000 to \$10,000.

WANTED.—A party with above amount to join advertiser with same amount in the manufacture of Picks, Mattocks and Sledges; or will buy an interest in a business already established. All communications confidential. Address, "H. E.,"
Office of The Iron Age, 83 Reade St., New York.

Wanted.

A Coffee Mill Squeezer
In good working order. Address,
PENN IRON CO., LIMITED,
LANCASTER, Pa.

PUNCHING PRESS AND SHEARS FOR SALE.—New Roller-maker's Punching Machine, 24 inch throat. Punches 3-4 hole in 3-4 iron. Also Power Shears, cutting 3-4 plate iron, 27 or 31 inch throat. Also larger sizes, single and combined. PERKLESS PUNCH AND SHEAR CO. 38 W. Day Street, New York.

Special Notices.

For Sale.

One Standard 25 H. P. Return Tubular Boiler, new; best material; 42 in. diameter, 10 ft. long, 38 3/4 in. tubes; manhole beneath tubes; dome 22 in. diameter, 24 in. high; entire iron fire front of excellent design for same.
One Standard 15 H. P. Upright Tubular Boiler, new; best material; 36 in. diameter, 7 ft. high, 68 3/4 in. tubes; heavy cast-iron base, with ash-pit, &c.
One second-hand Horizontal Steam Engine, in thorough repair, 8 1/2 in. bore 2 ft. stroke; suitable for an iron mine or other rough work.
One second-hand Lifting or Bucket Pump, suitable for an iron mine or slate quarry; in thorough order; 8 in. bore 5 ft. stroke.
One new Power Pump (hundreds in use in the Lehigh Valley); 6 in. bore 4 ft. stroke.
The foregoing articles ready for immediate delivery.
One 8 in. bore 16 in. stroke engine, and one 12 in. bore 2 ft. stroke engine in process of construction.
Address, W. H. BARBER & CO.,
Allentown, Pa.

Iron Works for Sale.

Great Opportunity for Capitalists or Practical Machinists.

A manufacturing property, situated in the liveliest and prettiest city in Michigan, consisting of Machine Shops, Foundry, Boiler Works, Smithy, Woodworking Shop, Pattern House and valuable patterns, Boiler House, &c., with all machinery in good running order, for sale at a bargain. Property consists of brick and frame buildings, covering nearly a square in center of city; good railroad facilities, and has an established reputation throughout the country. Property leased for high rental, subject to sale. Correspondence solicited. For particulars, plans, terms, reasons for sale, &c., apply to
BENJ. SOMMERS,
Green Bay, Wisconsin.

Dissolution of Copartnership.

NORRISTOWN IRON WORKS. }
NORRISTOWN, Pa., August 5, 1882. }

The copartnership heretofore existing between James Hooven, J. Henry Hooven and Alexander Hooven, under the firm name of James Hooven & Sons, is this day dissolved by mutual consent. J. Henry Hooven retiring from the business. The affairs of the late firm will be settled by the remaining partners, who will continue the business under the firm of James Hooven & Son.

JAMES HOOVEN,
J. HENRY HOOVEN,
ALEXANDER HOOVEN

Wanted.

A thoroughly competent foreman to take charge of foundry, must be accustomed to both green and dry sand work. To one who can work in the interest of his employer and not for the men exclusively, this will prove a good opportunity. I am willing to pay the right man a good salary.
Address, E. J. J.,
Office of The Iron Age, 83 Reade St., New York.

Salesman Wanted.

A man wanted to travel and solicit orders for Machinery, Tools and Supplies. Must have some knowledge of machinery, with a good address and plenty of energy. Situation in out of New York. Address with full name and references, MACHINERY AND TOOL DEPOT,
Office of The Iron Age, 83 Reade St., New York.

Ten to Fifty Thousand Dollars

Can be invested at good profit in a close corporation, in good standing, which has recently tripled its facilities for manufacturing, and still cannot do justice to the opportunity. Home and export trade connections the very best. Responsible principals, having the required cash to invest, active or silent; give real name and reference to INTERCHANGEABLE,
Office of The Iron Age, 83 Reade St., New York.

Cutlery Salesmen Wanted.

By a manufacturing and importing cutlery house in this city. To those who can control a trade among retailers liberal terms will be given.
Address, X. Y. Z.,
Office of The Iron Age, 83 Reade St., New York.

Wanted.

A Practical and Skillful Mining Engineer and Geologist.

A middle aged and married man preferred. Address with testimonials,
HEMATITE ORE,
Office of The Iron Age, 83 Reade St., New York.

TO MANUFACTURERS.

A well-known N. Y. Commission House, having large facilities for exportation of Hardware and House Furnishing Goods to Home and Export trade, is desirous of representing one or two more manufacturers in above lines.
Address, W. & W.,
Office of The Iron Age, 83 Reade St., New York.

Wanted.

A position as Traveling Salesman, either at a moderate salary or on commission. Have some acquaintance among the trade, and experience in the Hardware business, both on the road and in the store.
Address, B. B.,
Office of The Iron Age, 83 Reade St., New York.

WANTED.—A position in a strictly Wholesale Hardware House as salesman, of a traveling position on road for a Manufacturer. Was salesman seven years for a large Wholesale Hardware House and on road five years for Store Manufacturers and Metal Houses; would commence service any time after September 1st. Reference, past and present employers.
SALESMAN,
Office of The Iron Age, 83 Reade St., New York.

HARDWARE MANUFACTURERS, ATTENTION.—The best Alarm Money Drawer in the world. Cannot be picked. Easiest working. Three distinct blows on alarm bell. No winding. WALTER L. CHENEY, 34 Beach Street, Boston, Mass.

MANUFACTURERS OF HARDWARE OR House Furnishing Goods wishing to be represented to the Jobbing Trade of New York, Address, MANUFACTURERS' AGENT,
Office of The Iron Age, 83 Reade St., New York.

To Lease.

The Machinery Complete of a Plate and Sheet Mill.

Machinery modern, ready to set up, and in good order. Address, THOS. R. McKILLIP,
130 Dearborn St., Chicago, Ill.

Special Notices.

For Sale.

10,000 Acres Iron, Coal and Timber Land,

situated in Western Maryland, on the Youghiogheny River. The R. & O. R. R. runs past the western side. The Pittsburgh and Connellsville Division of the road, and other roads projected through the property, will be completed this year. More than half of the timber is the choicest white oak, balance spruce, cherry, hemlock, poplar and ash, estimated to cut 50,000 feet per acre. The Youghiogheny River runs the entire length of the property, furnishing ample water power. There are millions of tons of the best bituminous coal, which can be mined at 60 cents per ton, placed on board the cars at 15 cents. Contract freight to Baltimore, \$2.15 per ton. Several veins now open, measuring from 3 to 24 feet each. The iron is a compact red hematite of specific gravity 4.946. The following is the assay:

Ferrous oxide	10.30
Ferric oxide	81.04
Silica	5.20
Alumina	1.25
Aluminum	.23
Sulphur	.336
Phosphorus	.131
Total iron	65.4

Fire clay and limestone exists in large quantities of superior quality. This is considered by those familiar with the property as being one of the most valuable tracts of the kind. Price, \$35 per acre; one half cash, balance 12 and 24 months. For further particulars address
P. O. BOX 3073, New York.

For Sale.

If taken at once, the best Hardware and Iron store in New England; a clean stock of about \$20,000, and old established business; long lease and low rent. Owner going into other business out of the State the reasons for selling.
EXCELLENT OPENING, Box 22,
Office of The Iron Age, 83 Reade St., New York.

For Sale, Cheap.

For want of use, Modern Horizontal 30 Horse Power Engine, with or without tubular boiler made for it, and ore bank gearing. All in first-class running order.
Address, P. O. BOX No. 75,
Vesta, Lancaster Co., Pa.

FOR SALE.
New Planer, 32 in. x 26 1/2 in. x 1 1/2 ft.; New Planer, 34 in. x 27 1/2 in. x 1 1/2 ft.; New Planer, 38 in. x 28 1/2 in. x 1 1/2 ft.; New Lathe, 18 in. x 8 1/2 ft.; New Lathe, 18 in. x 10 1/2 ft.; New Lathe, 22 in. x 10 1/2 ft.; New Lathe, 22 in. x 12 1/2 ft.; New Lathe, 24 in. x 16 ft.; New 15 in. Column Drill Press; Second-hand 10 in. Column Drill Press, good as new; Second-hand 45 in. Column Drill Press, good as new; Second-hand Planer, 22 in. x 22 in. x 5 ft.; Second-hand Planer, 12 in. x 12 in. x 5 ft.; BROOKS & WINEBRENER, 261 N. 3d St., Philada.

FOR SALE.
Two Steam Hammers complete, cheap.
KOLB,
Cor. 5th and North 11th Sts.,
Brooklyn, E. D., L. I.

Magnetic Ore Mines.

I want from (with or without additional capital) a large output of a Magnetic ore situated near the arren County, N. Y. Quality unlimited. The investment will be made secure and profitable.
ARPENTER,
41 South 3d Street, Philadelphia.

To Brass Foundries.

Our new FOOT SHEAR, for cutting off GATES from brass castings, is now ready. Weight, 220 lbs. Price complete, \$549, net. A boy can operate it easily. We warrant them to give the most perfect satisfaction.
PEERLESS PUNCH AND SHEAR CO.,
38 W. Day Street, New York.

Wanted.

A Competent Machinist,
who has had experience as a millwright and in the use of steam, to take the position of millwright in a large works.
Address, P. O. BOX 240, Albany, N. Y.

Wanted.

A SUPERINTENDENT FOR A MERCHANT IRON MILL.

Must be a thoroughly practical and competent man. Address, with references,
MERCHANT BARS,
Office of The Iron Age, 83 Reade St., Phila., Pa.

Wanted.

PUDDLERS, ROLLERS AND HEATERS.
No Union men need apply. To steady, competent men permanent situations and good pay.
HELMBACHER FORGE & ROLLING MILL CO.,
St. Louis, Mo.

Wanted.

A First-class Hardware Traveling Salesman.
Must be well acquainted and thoroughly posted in the Lock trade. Address,
CHICAGO HARDWARE MFG. CO.,
20 to 30 Erie St., Chicago.

Wanted.

A Partner with \$5000 to \$10,000 in a Foundry and Machine Business, established in 1824. For particulars, inquire of
I. H. COLLIER,
Poughkeepsie, N. Y.

A Salesman

would like to secure agencies for some manufacturing companies in the Hardware line in New England.
H. D. G.,
22 Indiana Place,
Boston, Mass.

Wanted.

A Second-Hand Upright Engine,

36 or 40 inches by 48 inch stroke.
Address, P. O. BOX 784,
McKeesport, Pa.

Special Notices.

NEW IRON WORKING MACHINERY.

ENGINE LATHES.

38 in. triple gear (bed to suit). Fitchburg.
28 in. swing, 18 foot bed. Fitchburg.
26 in. swing, 18 foot bed. Fitchburg.
24 in. swing, 14 and 16 foot bed. Fitchburg.
21 in. swing, 12 and 14 foot bed. Blaisdell.
20 in. swing, 14 foot bed. Fitchburg.
20 in. swing, 12 foot bed. Fitchburg.
19 in. swing, 10 and 12 foot bed. Gray.
18 in. swing, 10 and 12 foot bed. Blaisdell.
17 in. swing, 6 foot bed. Johnson.
16 in. swing, 6 and 8 foot bed. Fitchburg.
14 in. swing, 6 and 8 foot bed. Fitchburg.
13 in. swing, 6 and 8 foot bed. Blaisdell.

PLANERS, SHAPERS & SLOTTERS.

30 in. x 36 in. x 9 foot Planer (2d hand; good order). Wheeler.
30 in. x 30 in. x 10 foot Planer. Hewes & Phillips.
30 in. x 30 in. x 8 foot Planer. Fitchburg.
26 in. x 24 in. x 6 and 7 ft. Planer. Wheeler.
25 in. x 25 in. x 8 foot Planer. Fitchburg.
22 in. x 20 in. x 4 foot Planer. Wheeler.
18 in. stroke Shaper. Gould & Eberhardt.
10 in. stroke Shaper. Gould & Eberhardt.
10 in. stroke Shaper. Fitchburg.
12 in. Slotter (swing 46 in.). Hewes & Phillips.

DRILL PRESSES.

60 in. Radial Drill double-gear, self-feed, planed and slotted bed plate with portable table; best English make (Tangye); weight 4 tons.
48 in. Radial Drill, double-gear, self-feed, slotted and planed bed. Betts.
30 in. back-gear, automatic. P. entice.
25 in. back-gear, self-feed. Fitchburg.
25 in. quick return. Blaisdell.
19 in. quick return. Blaisdell.
18 in. quick return. Fitchburg & Blaisdell.
2, 3 and 4 spindle drills. Garvin.
15 in. swing 5 ft. bed Box Brass Lathe. Gage.
No. 2 (1/4 x 1 1/2) Bolt Cutters. Merriman's.
Power and Hand Mills. Garvin.
These tools are on hand and for quick delivery.

KELLY & LUDWIG,

49 & 51 N. 7th St., Philadelphia, Pa.

FOR SALE.

One Horizontal Engine, 30 in. x 48 in. One Horizontal Engine, 24 in. x 36 in. One Horizontal Engine, 20 in. x 30 in. One "Corliss" Horizontal Engine, 18 in. x 48 in. Two Horizontal Engines, 10 in. x 30 in. Two Horizontal Engines, 20 in. x 30 in. Two Link-motion Engines, 18 in. x 40 in. One Upright Engine, 30 in. x 30 in. Housings, Plinths and Bed Plate suitable for 18 in. train.
JOHN CARROLL,
264 and 266 Water Street.

For Sale.

18 x 48 CORLISS HORIZONTAL ENGINE,
Band Wheel 16 feet by 24 inch face. Can be seen running until September 1st at
CHROME STEEL WORKS,
Brooklyn, E. D.

For Sale.

TWO BOILERS.
Are in fair condition, not having been used since overhauling. Size, 22 ft. long, 4 ft. shell, two 16 in. flues.
THE FARIST & WINDSOR CO.,
Bridgeport, Conn.

For Sale.

ONE LARGE, SOLID, DOUBLE-ARMED BAND WHEEL,
11 feet 4 inches diameter, 2 feet 6 inches face, bored for 6 1/2 inch shafting. Will be sold cheap.
AKRON RUBBER WORKS,
Akron, Ohio.

For Sale.

Two new 28-inch Upright Drills, weight 1500 lbs.; quick return; balance spindle—latest design; price, \$200. 3 new 26-inch Upright Drills, same design, only smaller; \$160; just completed, with Worcester chuck: 18 in. diameter; length of bed 8 1/2 ft.; table 6 ft.; planks 26 in. wide, 24 in. high; weight over 400 lbs.; one of the smoothest running and stiffest Planers made; price, \$750.
S. M. YORK,
Cleveland, Ohio.

Corliss Engines For Sale.

PROMPT DELIVERY.
One—12-inch cylinder, 36-inch stroke, at once.
One—14-inch cylinder, 36-inch stroke, in two weeks.
Apply to
THE GEORGE PLACE MACHINERY CO.,
121 Chambers and 103 Reade St., New York.

For Sale.

MACHINES
For making Solid Punched Axes, and Washes Picks, Mattocks and Hammers, with Dies Complete. Address, T. & CO.,
Box 25,
Office of The Iron Age, 83 Reade St., New York.

For Sale.

A GOOD MUCK BAR AND SCRAP SHEAR,
For \$310. Address
CRAIG RIDGWAY & SON, Coatesville, Pa.

For Sale.

Second-hand
DROPS AND LIFTERS.
BEECHER & PECK,
Lock Box 122, New Haven, Conn.

For Sale.

Horizontal Engines, 16 x 42 (Hewes & Phillips), with cut-off; 16 x 36 (Currier), with cut-off; 16 x 24 Upright Engines, with cut-off; one 16 H. P. Locomotive Boiler; one 4-ton "Otis" Freight Elevator; one 50 H. P. Horizontal Tubular Boiler. All the above guaranteed complete and in perfect order. For particulars address
BELCHER & BAGNALL,
40 Cortlandt St., N. Y.

Machinery For Sale. (ALL NEW).

One 20-in. Power Drill Press. Three 20-in. Davis Power Drill Presses. Six Hand Blacksmith Drills. Three Gear Cutting Attachments for Lathes. Twelve Assorted Chucks, 4 in. to 18 in. One Bolt Cutter, 4 1/2 in. to 14 1/2 in. Three Barres Lathes. Six Hand Shearing and Punching Machines. Two Star-tent Blowers. One 4-ton "Otis" Freight Elevator. Engine 10 x 24. One second-hand Horizontal Engine 10 x 16.
JACKSON & TYLER,
16 and 18 S. Howard St., Baltimore.

Shears For Sale.

POWER SHEARS for cutting Bar and Scrap Iron, 6 in. x 1/2 in., 2 in. x 1/2 in., and 1 1/2 round or square, "Alligator" style, new. Net price, \$120. Immediate delivery.
PEERLESS PUNCH AND SHEAR CO.,
38 W. Day St., New York.

WANTED.—A position by a thorough Hardware Salesman and Bookkeeper, either in the house or traveling, on commission or salary. Can furnish unquestionable reference. Address, P. O. BOX 440, St. Louis, Mo.

Special Notices.

MACHINERY

For Sale.

Two 15 in. swing, 6 ft. bed, Prentice Lathes.
Two 18 in. swing, 6 ft. bed, New Haven Lathes.
Above are back geared and screw cutting.
One 20 in. Prentice Drill.
One 26 in. Prentice Drill, back geared and self feed.
One 30 in. Prentice Drill, back geared and self feed.
One 10 in. Gould & Eberhardt Shaper.
One 15 in. Gould & Eberhardt Shaper.
One 20 in. Gould & Eberhardt Shaper.
One No. 1 Davidson Steam Pump.
One No. 11 Cupola Bottom.
1200 ft. of 16-lb. English T. Rails, with spikes, in bond.
Greenfield Engines, 2 1/2 to 25 horse power.
Roots Force Blast Blowers, all sizes.
All of above Machinery is entirely new, and can be seen at our warehouses.
For further particulars address

COOKE & CO.,

12 (Old No. 6) Cortlandt Street,
NEW YORK CITY.

For Sale.

A New York Steam Engine Co. Radial Drill; new and first-class in every respect; will drill to the center of 7 feet.
Send for description.
JOSEPH LUMLEY,
144 N. 3d St., Philadelphia, Pa.

FOR SALE OR TO RENT.

New, light Factory; 70,000 floor feet; 275 H. P. Corliss Engine, giving power at minimum cost.

Shafting, piping, elevator, &c., all complete and modern. Lowest insurance rates. Railroad siding and ample yard room. Immediate possession.

A large quantity of General and Special Machinery at low prices.

SHARPE RIFLE COMPANY,

Bridgeport, Conn.

Manufacturing Property for Sale.

The Real Estate of the late Foundry and Machine Company of Taunton, Mass. Buildings consist of Foundry, Machine, Erecting and Blacksmith Shops, and covering about 60,000 square feet of ground. For particulars apply to
THE GEORGE PLACE MACHINERY AGENCY,
121 Chambers St., New York.

For Sale.

The Industrial Works of Shamokin, owned and successfully carried on for a number of years by the late Wm. Brown, deceased, consisting of Foundry and Machine Shop, and a large stock of Patterns regarded as part of the property. Boiler Shop, Blacksmith Shop and Factory for the manufacture of heavy coal screens. Well located in the borough of Shamokin, Pa., with the best facilities for shipping by rail, and surrounded by a district contributing all the work that a shop of that kind can possibly turn out. The works are now running, but in a very short time possession can be given. Easy terms of payment are offered to suit a purchaser of limited capital.
Offered for sale by
WM. McILVAIN & SONS,
Reading, Pa.

For Sale.

One 6-ton fly-wheel, 12 ft. dia., 15 in. face, 9 1/2 in. bore price 30 per lb.
One fly-wheel, 4 ft. dia., 3 1/2 in. bore; price, 30 per lb.
One fly-wheel, 4 ft. dia., 4 1/2 in. bore; price, 30 per lb.
One pulley, 7 ft. dia., 15 in. face, 9 in. bore; price, 30 per lb.
One pulley, 4 ft. dia., 12 in. face, 3 1/2 in. bore; price 30 per lb.
Two pulleys, 4 ft. dia., 18 in. face, 4 1/2 in. bore; price 30 per lb.
One pulley, 4 ft. dia., 16 in. face, 4 1/2 in. bore; price, 30 per lb.
One pulley, 5 ft. dia., 18 in. face, 4 1/2 in. bore; price, 30 per lb.
One pulley, 5 ft. dia., 21 in. face, 4 1/

Machinery.....	233	18,085
Metal goods.....	131	19,006
Nails.....	11	58
Needles.....	6	4,153
Nickel.....	24	6,260
Old metal.....	4,867	2,768
Platina.....	2	294
Plated ware.....	8	411
Percussion caps.....	6	1,091
Pins.....	400	11,462
Quicksilver.....	10	3,154
Saddlery.....	33,542	100,347
Steel blooms.....	4,598	26,232
Spelter, lbs.....	33,804	134,000
Silverware.....	7	454
Tin, bbls.....	29,760	187,208
Tin, bbls.....	10	550
Tin, slabs.....	1,831	20,908
Wire.....	5	1,550
Zinc, lbs.....	233,793	10,458

The imports of leading articles compare with previous weeks as follows:

	For the week	33 weeks	Same time
Cutlery, pkgs.....	188	4,744	4,508
Hardware, pkgs.....	735	701	701
Iron, R. R. bars.....	18,040	25,064	25,064
Lead, pkgs.....	25,351	10,119	10,119
Steel, pkgs.....	33,542	7,778,142	65,129
Tin, boxes.....	30,760	14,740	1,018,708
Tin slabs, lbs.....	150,640	11,017,099	9,940,752

REPORTS OF SPECIAL.

For the week ended August 19:

Total.....	\$208,435
Previously reported.....	\$4,450,063

Total since January 1, 1882.....	\$42,748,498
Same time in 1881.....	\$7,271,054
Same time in 1880.....	\$5,191,271
Same time in 1879.....	\$11,598,101
Same time in 1878.....	\$10,119,097
Same time in 1877.....	\$21,947,581
Same time in 1876.....	\$30,930,328
Same time in 1875.....	\$3,777,955
Same time in 1874.....	\$3,777,955
Same time in 1873.....	\$3,777,955
Same time in 1872.....	\$3,777,955

EXPORTS EXCLUSIVE OF SPECIAL.

For the week ending August 22:

Total.....	\$7,554,372	\$20,838,004	\$6,031,071
Prev. reported.....	\$20,348,644	\$25,079,948	\$20,096,283
Since Jan 1.....	\$57,602,016	\$24,218,014	\$11,027,954

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending August 23, 1892:

Hardware.	Wood, Neistrato & Co.
Baker Hermann & Co.	Wire rings, 75
Guns, pkgs., 26	Wood, Nieuhr & Co.
Danville L. Machinery, ca. 1	Rods, 249
David C.	Order.
Machinery, bxs., 4	Pig, lot, 1
Degrauw, A. J. & Co.	Wire rods, pkgs., 1
Dolgo Alfred.	Wire rods, bbls., 1
Midco, Co., 3	Wire rods, bbls., 1
Downing R. F. & Co.	Wire rods, bbls., 1
Machinery, pkgs., 1	Wire rods, bbls., 1
Drexel, Morgan & Co.	Wire rods, bbls., 1
Cases, 8	Wire rods, bbls., 1
Ernst J. & Co.	Wire rods, bbls., 1
Machinery, ca. 9	Wire rods, bbls., 1
Guns, 1	Wire rods, bbls., 1
Avila, 33	Wire rods, bbls., 1
Cases, 37	Wire rods, bbls., 1
Package, 20	Wire rods, bbls., 1
Folsom H. & D.	Wire rods, bbls., 1
Arms, ca. 35	Wire rods, bbls., 1
Graef Cutlery Co.	Wire rods, bbls., 1
Cutlery, ca. 6	Wire rods, bbls., 1
Graham.	Wire rods, bbls., 1
Machinery, ca. 1	Wire rods, bbls., 1
Hartley & Graham.	Wire rods, bbls., 1
Midco, ca. 4	Wire rods, bbls., 1
Handlen Franks.	Wire rods, bbls., 1
Machinery, pkgs., 1	Wire rods, bbls., 1
Junge F. W. & Co.	Wire rods, bbls., 1
Arms, ca. 5	Wire rods, bbls., 1
Kinney Tobacco & Co.	Wire rods, bbls., 1
Machinery, ca. 1	Wire rods, bbls., 1
Merchants' Dis. Co.	Wire rods, bbls., 1
Guns, ca. 8	Wire rods, bbls., 1
Moore's Sons J. P.	Wire rods, bbls., 1
Arms, ca. 2	Wire rods, bbls., 1
Outerbridge A. E.	Wire rods, bbls., 1
Machinery, ca. 1	Wire rods, bbls., 1
Pim A. W.	Wire rods, bbls., 1
Machinery, pkgs., 3	Wire rods, bbls., 1
Robinson D. W.	Wire rods, bbls., 1
Ca. 1	Wire rods, bbls., 1
Scott P.	Wire rods, bbls., 1
Arms, ca. 23	Wire rods, bbls., 1
Seavill M. Co.	Wire rods, bbls., 1
Midco, pkgs., 3	Wire rods, bbls., 1
Schoverling, Daly & Gale.	Wire rods, bbls., 1
Midco, ca. 4	Wire rods, bbls., 1
Surdan E.	Wire rods, bbls., 1
Machinery, ca. 1	Wire rods, bbls., 1
Taylor Thos. & Co.	Wire rods, bbls., 1
Cases, 4	Wire rods, bbls., 1
Wibbush, Hilger & Co.	Wire rods, bbls., 1
Midco, cutlery, ca. 1	Wire rods, bbls., 1
Winchester Arms Co.	Wire rods, bbls., 1
Guns, ca. 7	Wire rods, bbls., 1
Witte John G. & Bro.	Wire rods, bbls., 1
Needles, ca. 5	Wire rods, bbls., 1
Order.	Wire rods, bbls., 1
Cases, 18	Wire rods, bbls., 1
Cutlery, ca. 1	Wire rods, bbls., 1
Machinery, ca. 1	Wire rods, bbls., 1
Iron.	
Brown Bros. & Co.	Wire rods, bbls., 1
Swedish Iron, ca. 285	Wire rods, bbls., 1
Baring B. & Co.	Wire rods, bbls., 1
Rods, bbls., 10,422	Wire rods, bbls., 1
Pig, tons, 60	Wire rods, bbls., 1
Rail crop ends, tons, 450	Wire rods, bbls., 1
Wire rods, coils, 943	Wire rods, bbls., 1
Bond, Parsons & Co.	Wire rods, bbls., 1
Pig, tons, 200	Wire rods, bbls., 1
Carey & Moore.	Wire rods, bbls., 1
Wire rods, bbls., 423	Wire rods, bbls., 1
Crocker Bros.	Wire rods, bbls., 1
Pig, tons, 700	Wire rods, bbls., 1
Spiegel, tons, 27	Wire rods, bbls., 1
Drexel, Morgan & Co.	Wire rods, bbls., 1
Ore, tons, 100 1/2	Wire rods, bbls., 1
Elliot, Sons & Co.	Wire rods, bbls., 1
Ore, 100, 670, 100	Wire rods, bbls., 1
Electrical Sup. 17, 170	Wire rods, bbls., 1
Irwin Richard & Co.	Wire rods, bbls., 1
Pig, tons, 200	Wire rods, bbls., 1
Knoblauch & Lichtenstein.	Wire rods, bbls., 1
Wire rods, coils, 3100	Wire rods, bbls., 1
Lundberg Gust.	Wire rods, bbls., 1
Coils, 215	Wire rods, bbls., 1
Bundles, 121	Wire rods, bbls., 1
Bars, 4210	Wire rods, bbls., 1
Lillianberg & Co.	Wire rods, bbls., 1
Bars, 977	Wire rods, bbls., 1
L. L. & Co. & Co.	Wire rods, bbls., 1
Sheet, bbls., 620	Wire rods, bbls., 1
Lee Jas. & Co.	Wire rods, bbls., 1
Pig, tons, 400	Wire rods, bbls., 1
Macine A. F.	Wire rods, bbls., 1
Cuttings, crates, 7	Wire rods, bbls., 1
Matthew John.	Wire rods, bbls., 1
Cy. indus. 10	Wire rods, bbls., 1
Millikin & Smith.	Wire rods, bbls., 1
Wire rods, coils, 1913	Wire rods, bbls., 1
N. Y. Nat. Bk. Assn.	Wire rods, bbls., 1
Hoops, bbls., 1473	Wire rods, bbls., 1
Pierston & Co.	Wire rods, bbls., 1
Sheet, bbls., 433	Wire rods, bbls., 1
Hoop iron, ca. 13	Wire rods, bbls., 1
Stevenson, Hickson & Co.	Wire rods, bbls., 1
Pig, ca. 17	Wire rods, bbls., 1
Tillotson L. G. & Co.	Wire rods, bbls., 1
Wire, coils, 70	Wire rods, bbls., 1
Williamson J. & Co.	Wire rods, bbls., 1
Pig, tons, 400	Wire rods, bbls., 1

EXPORTS

Of Hardware, Iron, Machinery, Metals &c. from the Port of New York, for the Week ending August 23, 1892:

Dutch West Indies.	Quan. Val.
Mf. iron, pkgs. 25	\$61
Ptm., gals. 2570	263
Hdw., pkgs. 5	29
Dutch East Indies.	
Ptm., gals. 787,320	87,065
Hamburg.	
Hdw., pkgs. 15	430
Tubing, pcs. 74	797
Clocks, pkgs. 27	1,380
Sew. ma. pkgs. 14	20
Ptm., gals. 313,550	22,739
Mf. iron, pgs. 1	150
Mach'y, pkgs. 18	3,055
Ag. imp. pgs. 1	69
Rotterdam.	
Ptm., gals. 234,112	17,558
Gothenburg.	
Ptm., gals. 141,953	11,356
Danish West Indies.	
Ag. imp. pgs. 6	86
Ptm., gals. 453	474
Hdw., pkgs. 1	4
Mf. iron, pgs. 7	43
Clocks, pkgs. 13	79
Nails, kegs. 10	42
Bremen.	
Ag. imp. pgs. 381	2,422
Hdw., pkgs. 41	1,500
Ptm., gals. 649,984	47,072
Antwerp.	
Hdw., pkgs. 17	739
Copenhagen.	
Clocks, bxs. 79	821
Lighting rds. ca. 10	25
Mf. iron, pkgs. 25	1,000
Hdw., pkgs. 1	40
Ag. imp. pgs. 1	62
Konigsberg.	
Ptm., gals. 124,778	9,853
Arendal.	
Ptm., gals. 78,894	5738
Stettin.	
Ptm., gals. 144,814	11,168
Flensburg.	
Ptm., gals. 132,434	9,650
Amsterdam.	
Mf. iron, pgs. 3	156
Clocks, bxs. 20	279
Hdw., pkgs. 6	86
Liverpool.	
Mf. iron, pkgs. 14	274
Hdw., pkgs. 145	5,532
Cop. ml., bds. 125,000	1,500
Mach'y, pkgs. 34	74,939
Pistols, ca. 3	8
Ag. imp. pgs. 90	3,851
Sew. ma. ca. 5	213
Mf. iron, pkgs. 171	3,440
Stedwre, ca. 6	200
Hull.	
Hdw., pkgs. 115	410
Pumps, pkgs. 3	50
Clocks, pkgs. 7	1,609
Mf. iron, pkgs. 2	1,000
Ptm., gals. 318,700	25,426
Cutlery, ca. 6	84
Wringers, ca. 6	128
Ag. imp. pgs. 11	663
Pistols, ca. 2	14
Bristol.	
Clocks, bxs. 36	268
Dublin.	
Ptm., gals. 104,700	8,800
Nevers.	
Ptm., gals. 214,205	15,001
Cuba.	
Hdw., pkgs. 175	3,441
Spikes, kegs. 95	520
Mach'y, pkgs. 615	30,971
Ag. imp. pgs. 15	285
Tin, ca. 4	36
Cutlery, ca. 13	510
Ptm., gals. 410	470
Mf. iron, pkgs. 971	5,192
W. mills, ca. 8	191
Clocks, pkgs. 17	373
Pine, case 1	130
Nails, kegs. 155	1,478
Sew. ma. ca. 372	3,268
Nails, bxs. 12	58
Steel rails, 114	4,375
Iron tubes, 30	105
Tacks, ca. 1	3
Fire engine, 1	3,307
Venezuela.	
Sew. ma. ca. 207	2,058
Mf. iron, pkgs. 16	1,100
Mach'y, pkgs. 6	731
Ptm., gals. 11,800	1,246
Clocks, ca. 5	113
Hdw., pkgs. 47	489
Brass, gds. ca. 2	10
Nails, kegs. 5	23
Ag. imp. pgs. 3	232
Nails, bxs. 3	91
Tasmania.	
Nails, ca. 4	80
Ptm., gals. 10,500	2,300
Mf. iron, pgs. 14	270
Ag. imp. pgs. 26	190
Clocks, bxs. 10	730
Nails, pkgs. 1	30
Pozzuoli.	
Ptm., gals. 141,935	10,000
Porto Rico.	
Hdw., pkgs. 58	1,850
Iron, pkgs. 195	301
Iron tank, 1	400
Mach'y, pkgs. 1	40
Brass, gds. ca. 1	40
Ptm., gals. 23,408	2,350
Mf. iron, pgs. 12	191
Clocks, pkgs. 12	191
Pumps, pkgs. 3	77
Y. mt. shing. ca. 2	215
Ag. imp. pgs. 12	148
Revolver, ca. 1	110
Cutlery, ca. 3	27
Santander.	
Ptm., gals. 247,400	21,647
Alicante.	
Ptm., gals. 206,400	18,576
Bilbao.	
Ptm., gals. 113,500	9,935
Triciste.	
Ptm., gals. 203,764	15,285
Oporto.	
Ptm., gals. 49,828	3,648

OLD METALS, PAPER STOCK, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy.....	\$0.15
Light.....	0.14
Copper bottoms.....	0.13
Yellow Metal.....	0.12
Brass, heavy.....	0.11

Brass, light.....	0.10
Composition, heavy.....	0.15
Lead, heavy.....	0.14
Lead, light.....	0.13
Zinc.....	0.12
Pewter, No. 1.....	0.11
Pewter, No. 2.....	0.10
Wrought Iron.....	0.09
Light do.....	0.08
Stove Plate.....	0.07
Machinery do.....	0.06
Grate Bars.....	0.05
Electrotype plates.....	0.04
Stereotype plates.....	0.03
Small type.....	0.02

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen.....	3 1/2
White Cotton, New.....	3 1/2
No. 2.....	3 1/2
No. 3.....	3 1/2
Seconds.....	3 1/2
Soft Woollens.....	3 1/2
Mixed Rags.....	3 1/2
Gunny Bagging.....	3 1/2
Butte.....	3 1/2
Kentucky Bagging.....	3 1/2
Book Stock.....	3 1/2
Newspapers.....	3 1/2
Waste Paper and Scraps.....	3 1/2
Kentucky Bale Rope.....	3 1/2

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth st., PHILADELPHIA, Aug. 23, 1892.

We are unable to report any very great improvement in the general condition of the Iron market, the leading characteristics remaining much the same as noted in our last. The feeling in nearly all branches of trade has evidently improved and is still improving, and the Iron trade is sharing in this very desirable state of affairs. The improvement is certainly very gradual, but when followed closely is somewhat more than is generally supposed to be at first sight. The absence of heavy transactions gives the market a much quieter appearance than is really the case. In the aggregate a fair business is doing, which will compare favorably with the corresponding period in previous years.

Pig Iron.—Has undergone somewhat of an improvement during the week, but nothing very marked, and the demand has not been quite so active as was anticipated in some quarters. Certain buyers who were expected to be in the market and buy rather freely, either contracted for small lots or held off altogether. Buyers, as a rule, do not yet see their way clear to heavy buying, and sales have been mostly for 50 and 100 ton lots, with here and there a heavier contract. There are, however, more inquiries on the market, and the trade look upon these as forerunners of a revival of heavier buying. There is little doubt that a great deal of business is being held in check by the continued Western troubles, and until some more definite idea as to the course of the market after the resumption of work is arrived at, it seems probable that no great improvement will take place in the Eastern markets. Extra brands of Foundry Irons continue very scarce, and some furnaces are behind in deliveries; small lots for prompt shipment are very difficult to be had. One small lot was inquired for and was with great difficulty placed at \$26 at furnace. Prices are firm and there is some talk of an advance. Small contracts are being made outside figures, and in some special cases at an advance, but it is said that to heavy buyers prices would be quoted somewhat easier. Some lots of No. 2 Foundry have been selling at \$23 @ \$23.50, delivered in Philadelphia, but this brand, although slightly improved, is still neglected. Mill Irons are in good request, and medium sized lots are selling pretty freely. There is a good deal of inferior Iron offering, but buyers show no inclination to contract for such brands. Prices are very firm, and sales appear to be made mostly at outside figures. We quote the following as the basis of last week's sales: No. 1 Foundry, \$23.50 @ \$25.25; No. 2, \$22, and Gray Forge, \$20 @ \$21. The market for foreign small transactions is without animation, and few small transactions are few and far between. There was some little excitement toward the close of the week over a reported sale of 5000 tons of Bessemer at \$24.85, but after an exhaustive inquiry of the whole market we are unable to find the slightest trace of such a transaction. Buyers have been bidding in the neighborhood of \$24 for some time past, and although sellers generally have not been able to come down exactly to these figures, yet we are cognizant of parties who, on a firm offer, would have been open for business at figures considerably below those mentioned in the reported sale. A 500-ton lot of Bessemer, special brand, was sold at \$25.50, New York. We hear of nothing doing in Spiegeleisen.

Muck Bars.—Are steady and even, prices ranging from \$41.50 to \$43 at mill. Consumers continue to express their opinion as to the comparatively high price of material, and are seeking concessions, but producers are not disposed to sell at lower figures, and as many of the mills are reported full of work for the next three or four weeks, prices are firmly held. Extra brands are neglected, the demand being principally for medium and lower qualities.

Blooms.—Are moderately active and prices steady. Sales have been made at the following figures: Charcoal Blooms, \$70; Run-out Anthracite, \$60; Scrap Blooms, \$52.50, and Northern Ore Blooms, \$47.50 @ \$50.

Bir Iron.—At a meeting of the Philadelphia Rolling Mill Association, held yesterday, 21st inst., at the office of Jas. Rowland & Co., Philadelphia, the card rate, 2.6¢, was again reaffirmed and will be in force until next meeting. The market for Bar Iron continues dull and unsatisfactory; there is nothing of consequence doing, and prices are weak and irregular. City mills are busy and are said to be getting full card rates, but outside mills are turning business at concessions. Sales have been made all the way from 2.4¢ to 2.6¢ at mill. A lot for car purposes sold at the former figures; the latter figure is exceptional. Sales generally appear to be made at 2.5¢ @ 2.55¢. The feeling in regard to Bars is not so hopeful as it was, and opinions as to the future are various.

Cast Iron.

THE COPPER MARKET.

Messrs. Harrington, Horan & Co., Liverpool, report: Chili copper charters for first part of this month were advised on 17th inst. as 1400 tons fine, of which 600 tons bars and ingots, with 400 tons furnace material, are for England, and 400 tons bars for Continent. Price was \$18.77 1/2, and exchange, 35 1/4 d. Charters for second part of the month are to-day advised as 1200 tons bars and ingots, of which 750 tons are for England, and remainder for Continent. Price was \$19, and exchange, 35 1/4 d. Chili bar market has been firm throughout the fortnight, and fair sales have been made up to \$68. 7/6, spot, and \$69 forward, market closing firm at these rates. The sales of furnace material comprise: At Liverpool, 503 tons Chili regulus, ex Alpha, at 14/ 80 tons Canadian regulus at 13/9, 270 tons Peruvian and 39 tons Mexican ore at 13/9, 300 tons New Quadrada ore at 13/6 and 3100 tons Newfoundland ore, spot and arrival, at 23/1 1/2. At Swansea, 217 tons Bolivian regulus, ex Mary Jose, at 14/1 1/2, 140 tons Betts Cove regulus at 13/6, 380 tons New Quadrada ore at 13/6, 750 tons Union ore and 550 tons Berehaven ore at 13/3 and 1100 tons Newfoundland ore at 13/1 1/2. Precipitate—125 tons Mason's Spanish at 13/9, 95 tons at 14/ 50 tons Rio Tinto at 14/ 100 tons (leaf) at 14/1 1/2, 185 tons, English at 14/ 16 tons (seconds) and 25 tons Seville at 13/9 1/2 unit. There has been no Swansea sale during the past fortnight. Import of Chili copper during the past fortnight, 627 tons fine, against 2080 tons fine same time last year; delivery, 1332 tons, against 1268 tons. Import of other copper during the past fortnight, 1345 tons, against 741 tons; delivery, 1086 tons, against 1143 tons. Chili bar quotations are to-day, \$68. 7/6 @ \$69. 5/; 20th July, 1881, \$58. 15/ @ \$59. 15/; 30th July, 1880, \$61. 5/ @ \$62. 31st July, 1879, \$53. 5/ @ \$54. Chili ingots to-day, \$73; 20th July, 1881, \$66; 30th July, 1880, \$67; 31st July, 1879, \$59. Chili ore and regulus to-day, 13/9 @ 14/1 1/2; 20th July, 1881, 11/9 @ 12/; 30th July, 1880, 12/ @ 12/6; 31st July, 1879, 10/6 @ 11. Corocoro Barilla to-day, 14/6; 20th July, 1881, 12/6. Arrivals here during the fortnight of west coast of South American produce: Iberia, s. from Valparaiso, &c.: Regulus, 16; bars, 410; ingots, 210. At Swansea, nil. Stocks of copper (Chilian and Bolivian) in first and second hands, likely to be available, we estimate at:

	Ores.	Regulus.	Bars.	Ingots.
Liverpool.....	745	13,810	977	
Swansea.....	3,340	6,904	198	
Total.....	4,085	20,714	1,105	

Representing about 23,793 tons fine copper, against 24,498 tons 14th inst.; 31,672 tons July 29, 1881; 32,148 tons July 30, 1880; 30,454 tons July 31, 1879. Stock of copper contained in other foreign ore and Spanish precipitate, 2375 tons fine, against 1505 tons July 29, 1881; stock of Chili bars and ingots in Havre, 3227 tons fine, against 4522 tons July 29, 1881; stock of Corocoro Barilla in Havre, 23 tons fine, against 326 tons July 29, 1881; stock of copper other than Chili in Havre, 370 tons fine, against 1070 tons July 29, 1881; stock of Chili copper abroad and chartered for to date, 10,859 tons fine, against 9900 tons July 29, 1881; stock of foreign copper in London, chiefly Australian, 7800 tons fine, against 8800 tons July 29, 1881. According to the Board of Trade returns, the total imports and exports into and from this country for the first six months of the following years were:

	1880.	1881.	1882.
Copper in ores.....	15,203	13,622	13,349
Copper in regulus and precipitate.....	30,965	14,014	15,977
Bars, cakes and ingots.....	9,163	6,914	8,490
In pyrites, estimated.....	53,098	49,199	42,883
Total.....	108,329	83,549	76,709
English copper—Wrought and unwrought.....	14,811	15,880	13,273
For copper—Wrought.....	3,371	5,971	5,771
Yellow metal.....	7,380	7,254	9,107
Total.....	25,562	29,105	28,151

FOREIGN.

FRANCE.

Monteur des Interests Matériel.

PARIS, Aug. 6, 1882.—*Metals.*—Politics being better defined and crop prospects having improved, general business seems to revive; Metals are, however, in but moderate request and irregular. We quote: Copper—Chili Bars, 175 1/2; 177 1/2 francs; 100 kg.; Ingots and Slabs, 180 1/2; Best Selected, 185, and pure Corocoro Ore, 175. Tin—Banca, 281 1/2; Bullion, 280; Straits and Australian, 277 1/2, and English, 272 1/2. Lead, 30 @ 37, and Spelter, 44 1/2 @ 45. Iron.—Some dealers have raised the price in this city to 21 francs Merchant, and 13 Flooring; others still sell from store at former rates. At Longwy rates are well upheld and a good run of business is doing thereat, the market being sustained by English and Scotch orders. In Puddling Pig a large trade has transpired in that locality on the basis of 7.50. The adjudication of the Government for securing 200,000 tons of Steel Rails having led to no result, it is stated that it will now procure 100,000 tons abroad. As may be supposed, domestic producers now make a great outcry about this resolution. A single lot of 20,000 tons has been adjudicated to the Longwy Steel Works at the tender made by the latter of 210 francs per ton, delivered at St. Dizier. If the remaining steel rail makers think that they can for the Government by forming a ring to pay more than this figure, they are mistaken. The fact is that the favorable news from neighboring countries causes a very firm feeling in French Iron and Steel districts, and that the pretensions of makers at home are raised accordingly, but it nevertheless seems a questionable policy on their part to let a handsome job go abroad merely through obstinacy. Coal.—The tendency in the French Coal market also more and more favors the producer, so that a profitable campaign seems to be drawing near. In about a month's time from now we shall be able to form a judgment in this respect; meanwhile the market gradually takes an upward turn.

BRASS.

Moniteur Industriel.

BRUSSELS, Aug. 7, 1882.—*Iron.*—The situation of the Iron Trade improves from week to week in Belgium. An active demand prevails for most articles in the tin, causing prices to harden as we proceed. Work seems to lack nowhere, and orders are dropping in steadily. Some people are, nevertheless, still doubtful about the future, and prefer following the movement with a certain degree of hesitation, in which, perhaps, they are not wrong. English Pig is held firmly, but the dealings are moderate. On Wednesday last the price was 6.50 francs per 100 kg. Belgian Foundry Pig is quite scarce; producers decline in selling under 5.50. Puddling ditto is still sufficiently in stock to prevent a

pressing demand. The range is 5.25 @ 6.25. A tolerable amount of animation is noticeable in Merchant on the basis of 13 @ 13.50; some few rolling mills ask 14. Beams are in request at 14.50 @ 15. Sheets are in light supply, while the demand is on the increase at 18.50 @ 19; Boiler plates at 20.50 @ 21. Pine, 27 at this juncture not be amiss to examine the particulars of the Iron and Steel movement in this country during the first six months:

Importation.		Exportation.	
1881.	1882.	1881.	1882.
Tons.	Tons.	Tons.	Tons.
Cast Steel.....	5,350	4,059	29,469
Steel in Bars.....	898	1,079	1,852
Wrought Steel.....	502,553	550,738	178,300
Pig Iron.....	101,074	7,743	7,648
Old ditto.....	1,185	2,714	13,664
Iron Wire.....	4,814	2,731	2,842
Iron Rails.....	36	274	10,405
Sheets.....	473	100	10,060
Finished Iron.....	2,730	4,489	91,472
Nails.....	281	184	3,208
Other Iron.....	2,664	2,406	15,536
Castings.....	1,393	4,303	18,938

Coal—Coal is even more active and firmer than iron, the demand being equally brisk from all quarters. The price of iron has advanced 3 francs during the week.

HAMBURG.

HAMBURG, August 8, 1882.—*Iron.*—We are reported from Dortmund to the following effect, dated yesterday: "The outlook in the iron market is more cheerful at present than it has been at any previous time. The blast furnaces in operation have sold out their output in advance for months to come, and others will be run up to high in order to face the extraordinary demand that has developed of late for puddling pig, which has assumed such proportions that, in order to meet it, the production of Foundry Pig has had to be diminished. During the week prices have not changed, but an advance evidently impends in Bessemer, Luxembourg and Lilledig. For a long time to come there are, furthermore, fully engaged the rolling and wire-drawing mills, even beyond their capacity, and the consequence is that the lately raised prices are now willingly submitted to by their customers. The steel works have received large commands for Rails and Ingots. At the Eastern Railroad adjudication the Rheinland Westphalian works put down 150 @ 164.70 per ton at the works as their asking figures, which is no change from preceding tenders. A great demand exists for iron sleepers, spikes, &c. It is satisfactory, too, as regards Axes, Hoops and Car Wheels, and in all these large lines changed hands, the Dortmund Union being under contract therewith all the way to January 1, 1883. Continually fresh adjudications are being run up so high that the works are unable to run up so high that it will probably not improve further very soon. Coke is leaving handsome profits to the producer, but increased output will soon check the upward tendency. Metals.—The market has been quiet. We quote as heretofore: Lead, English Pig, 16 @ 16.50; German, 14.50 @ 15; Copper, 73 @ 77; Tin, 122 @ 126; Spelter, 17 @ 17 1/2. At Breslau, Silesian Union sold at 16.30 marks per 50 kg. P. S.—In Upper Silesia Merchant Iron advanced 1/4 mark per 100 kg.

HOLLAND.

Koch & Fillerboom.

ROTTERDAM, August 3, 1882.—*Tin.*—The determined assaults of operators for a fall in London have at length brought about a drooping tendency in Holland, Banca giving way to 63.45 guilders per 50 kg, and Billiton to 62. There are, however, no October-November sales at the close.

STATISTICS FOR JULY.

	1880.	1881.	1882.
July deliveries.....	7,280	10,560	8,558
Since Jan. 1 to July 31.....	75,893	86,610	70,948
Stock on warrants July 31.....	41,154	40,447	47,115
Unsold stock July 31.....	79,233	59,545	47,452
Adopt July 31.....	10,000	15,000	13,700

BILITON.

	1880.	1881.	1882.
July deliveries.....	6,801	13,662	7,195
From Jan. 1 to July 31.....	53,570	60,149	66,590
Unsold stock July 31.....	54,047	45,022	53,379
Adopt July 31.....	18,033	29,158	37,000

AUSTRIA.

(Austrian Trade Journal.)

VIENNA, Aug. 6, 1882.—*Iron.*—The Austro-Hungarian market continues in a favorable position. Consumers have readily submitted to the increase in price of Merchant Iron in Bohemia and Styria. Sales thereof are not very large at these enhanced rates, but still satisfactory, considering the season, while stocks everywhere are moderate in extent. Under these circumstances through the market has appeared fully justified, so that rolling mills in other portions of the monarchy have been induced to follow suit after having been opposed to the movement. Trade in Pig Iron has been quiet but steady; in Sheets it has been unusually lively. Half a dozen adjudications of Steel Rails to supply domestic railroads are announced to come off at once, embracing the delivery of 130,000 tons, under the Alpine Company contract, and taken to furnish the Tübingen-Loudeke Railway 48 iron bridges, to be delivered this fall and next spring. With such big transactions before us, Iron displays great firmness, and a steady advance in rate is obtained with comparative ease. The outlook, coupled with our fine crops, is a most cheerful one. We quote at the close, Common Fig. 51 @ 52; Gray 40, 54 @ 56; Bessemer, 57 @ 58; Banca per 100 kg., at the best figure, 175 1/2; 177 1/2 @ 180; Bohemian, 110 @ 115; Sheets for locomotives, 175 @ 185; do. for Rolling, 185 @ 195; do. for Tanks, 195 @ 200; do. for Boilers, 175 @ 185; and Beams, 125 @ 130. For tin, deliverable in this city, Metals have been unusually moderately active, consumers being very cautious in their operations as long as the continual wide fluctuations keep the Western European markets unsettled. Prices are, therefore, more or less nominal; we consequently abstain from quotations about the same as last given.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PENANG, June 30, 1882.—*Tin.*—Receipts during the fortnight have been 640 piculs. The market opened at \$2.25, and rose to \$2.75 under a good Chinese demand. During the past few days some demand for European tin has sprung up, carrying figures to \$3.15 @ \$3.25, closing thereat with considerable firmness. Resales included there changed hands altogether 640 piculs, 1450 of which for Europe, and 1450 taken by Chinese. Stock to market is at present valued at 2000 piculs. Exchange—4 months bank 3/4%.

(Hillman, Wood & Co.)

SINGAPORE, July 6, 1882.—*Tin.*—The advance in London has caused improvement there, prices having risen from \$2.75 to \$3.15 per picul, and at the close there are some 100 piculs in stock. We make the sales 280 tons, but much more could have been sold had dealers not been such firm holders. The Fleura Castle took for New York 84 piculs. Total shipments for the six months from the Straits settlements to the United States, 40,000 piculs, against last year, 34,230; 71,740 in 1880; 48,041 in 1879; 35,328 in 1878, and 30,918 in 1877. Freight.—The supply of tonnage continues large, and berth rates are low. For New York the only vessel loading is the Peter Rickmers, and she has had to accept rather lower rates; for Boston no charters have been made, and the berth is vacant. Exchange is weak at 1/16 for 6 months' credit, London.

(Hessener & Co.)

COLOMBO, July 8, 1882.—*Pumblago.*—Unfavorable weather retards supplies, and no new business has transpired. We quote in rupees, 70 ton: Fine

INDUSTRIAL ITEMS.

MAINE.

At Camden, the Camden Anchor Works, H. E. & W. G. Alden, proprietors, report business as good. They have been shut down in order to make repairs on their works, which are now completed, and their shops are running full force with a full complement of hands.

Knowlton Bros., machinists and iron founders, and manufacturers of all kinds of ship chandlery, are doing a driving business. They make a specialty of ships' iron windlasses, pumps and capstans, also all kinds of iron and brass castings for shipbuilding. This is one of the oldest concerns in this town, having been established about 33 years, and their work is widely known and of excellent reputation, and the demand for their articles is steadily increasing.

All the nail machines at the iron works at Pembroke are running, employing a large number of men.

MASSACHUSETTS.

The Washburn & Moen Manufacturing Company, at Worcester, are building an addition 50 by 365 feet, and five stories above the basement to the north end of their Grove street works. They are also erecting a new galvanizing building 90 by 140 feet, and four stories high, at their Quinsigamond works.

Prof. H. B. Richardson, of Amherst, has invented a new hydraulic engine. The principle by which it operates is simple, and the object is to obtain the greatest amount of power possible with the least possible amount of water. For this purpose the engine is constructed with four, six, or eight cylinders, according to size, and these are arranged around a central valve which admits water on to one-half of the cylinders and allows it to exhaust from the others. The pistons bear against a ring lever which acts upon a pulley, producing the revolution. By changing the cut-off the machine can easily be adapted to run by steam-power. The application for a patent has been made.—*Boston Commercial Bulletin.*

There are now over 1500 employees at the Lowell Machine Shop, Lowell—more than in any previous year. When the improvements now in progress are completed there will be 400 additional hands employed.

The new machine shop of Reece Bros., at Greenfield, will be ready for occupancy by September 1st. A 15 horse-power engine with steel boiler has just been put in.

PENNSYLVANIA.

Workmen are building an addition of 16 feet to the stack of the Fairchance Furnace, Fayette County, which will increase its capacity considerably.

Wamhoff & Co., of Monongahela City, are adding a 10-pot furnace to their glass works. The lower nail factory at Hollidaysburg has been cutting daily over 150 kegs of first-class nails, for which the demand is greater than the supply. In the rolling mill, work has commenced for the building of six additional puddling furnaces.

About March 1st the Hecla Coke Company broke ground for their works in Mt. Pleasant Township, Westmoreland County, four miles northeast of Mt. Pleasant. Several weeks ago they reached coal at a depth of 207 feet. Work was begun on 100 ovens May 1st, and they have 93 rings completed. The company will start the works with 100 ovens, intending to build additional ones afterward. They expect to be burning coke by the first of September. The company have a storeroom, stables, 23 houses and 20 shanties; 120 men are employed, and there are about 500 inhabitants in the new mining village. The officers of the company are William Thaw, Jr., chairman; James Darnie, general manager; G. C. Hewitt, superintendent. The company have a body of coal amounting to 425 acres, and 50 acres surface.

PITTSBURGH AND VICINITY.

A number of the window-glass factories of this city are being equipped with smokestacks to carry off the smoke instead of the old-style cupolas. A. D. H. Chambers & Co. were the first firm to adopt the stacks. The only drawback to their success is that they create too heavy a draft, but with improved dampers they operate admirably.

The rail department of the Bessemer Steel Works, at Homestead, which has been shut down for two weeks for repairs, resumed operations yesterday. The blooming department of the same mill will not start up until September 1.

The blast furnaces are about the only thriving works along the Allegheny River. At the Isabella, No. 2 is being rapidly relined and the three new Whitwell ovens are nearly completed. Riter & Conley are now engaged in erecting the new hoist, which will be about 100 feet high, and will cost about \$30,000. The new casting house, which has been enlarged, is a part of the Centennial building, and is nearly finished.

Carnegie Bros. & Co. have laid the foundations for four new furnaces.

Adams & Co., the pressed glass manufacturers, have leased the old Mulvaney factory on Seventeenth street, South Side, which has been idle for a year, and are fitting it up so as to be in readiness to commence work on the 1st of next month. They will make chimney and table ware.

Oliver Bros. & Phillips' new wire mill, which occupies the old Bakewell & Pear's table-glass factory will be ready for work this week.

The Empire Plow Works, E. S. Hartman, superintendent, have been constantly undergoing improvements, until they are one of the largest and most complete works of this kind in the country. The building is 200 x 200 feet, three stories high. They turn out 8 tons of steel shapes and 150 plows per day. Among the appliances are 8 steam front presses, 3 beveling machines and 2 steam hammers. They are now putting in new automatic machines that will greatly reduce the cost of manufacture. Shipments are made to all parts of the United States. The framework for the Cannonsburgh roll-

ing mill is entirely up, and the building is being rapidly pushed to completion.

OHIO.

The Ward Iron Company have received five car loads of heavy machinery for their new rolling mill at New Philadelphia, including a large double engine. Work on the new mill is progressing rapidly, and Mr. Wagstaff, the superintendent, thinks they will be ready to kindle fires some time in October. These works, when completed, will be the largest in Eastern Ohio.

The Vulcan Iron Works, Toledo, are building a new boiler shop 100 x 80, to be fitted with improved machinery, including a power riveter.

The Globe Iron Works, Cleveland, are increasing their capacity by erecting a 3 story brick building 120 x 101.

The dimensions of the buildings of the Bartlett Iron and Steel Works, Vermilion, to be shortly erected, will be 60 x 100 feet. The capital of the company is \$500,000. Several hundred men will be employed.

The Standard Oil Company have placed an order with Sharpe & Daniels, operating the rolling mill at Alikanna, for 20 tons of hoop iron a day, for 15 months, from July 10, 1882.

The Watt Mining Car Wheel Co., Barnesville, have taken advantage of the dull season and put an addition of 20 x 100 feet to their works to be used as a pattern shop and also for building coal cars. New machinery has been put in for manufacturing Watt's patent self-oiling car wheel.

The Niles Tool Works, Hamilton, have received an order from Scotland for a large number of tools, including drills, drill presses, hydrostatic wheel press, &c.

ILLINOIS.

The first lot of castings from the annealing ovens of the Aurora Malleable Iron Works, which was turned out last week, proved satisfactory, and the works are pushed to their utmost capacity to keep up with their orders. There will soon be placed in these works another 15-ton oven. The works are filling large orders for the Elgin (Ill.) Tubular Iron Tower Company, also, a 250 foot electric light tower, to go to Indiana. This last order, with others on hand, will require over 6 tons of malleable castings. The works are sending large quantities of brass to Rock Island, Ill., and gray iron castings to Omaha, (Neb.) firms.

The Calumet Iron and Steel Company, Chicago, are pushing the erection of their four open-hearth Siemens-Martin furnaces, and expect to be ready to make all descriptions of open-hearth steel in 30 days. Every department of the works is being run double turn.

The walls of the building of the Northwestern Horse-Nail Company, at Brighton, are now ready to receive the roof.

The total number of men at present employed at the Union Iron and Steel Company's works is 2500.

The Bergen Tool Company, of Batavia, are again putting additional machinery in their works. They will shortly place on the market several new and improved tools.

The Chicago Forge and B-I Company, of South Chicago, will erect a new building, 50 x 60, adjoining the present works.

Colby, Bros. & Co., of Aurora, have in course of construction 24 engines. This firm are also building a number of drill presses, and report business good.

MISSOURI.

The Excelsior Stove Works, known as Filley's Foundry, on North Main street, on Monday last suffered another fire, though the loss will not exceed \$3000. The serious losses suffered by this establishment last year and two years ago created much excitement when it was learned the works were on fire, but, fortunately, this time the loss was trifling and will not interfere with the regular business.—*St. Louis Age of Steel.*

The Missouri Barb Fence Co., of St. Louis, have just put in a new engine.

LABOR AND WAGES.

The strike in the Cumberland coal region seems nearing its end, resulting as all others lately have, in the victory of the operators. At a meeting of several lodges of the Amalgamated Association, held in Pittsburgh last week, it was decided to notify the blacksmiths and hammer men working at Wilson, Walker & Co.'s, that when the present stock of iron is worked up they must quit; if they do not they will be pronounced black sheep. If this action really was taken, it remains to be seen how much effect it will have.

John Davis, the Pittsburgh coal miner held for trial on a charge of conspiracy, was released on bail. Two Saw-Mill Run miners became his bondsmen to the amount of \$1300.

The following is a sample of the statements of the wealth "galore" of the Amalgamated Association and its sources, that appear from time to time in the Western papers: A member of the Amalgamated Association last night stated that \$30,000 in cash was coming to the relief of the Pittsburgh strikers from Cincinnati, and \$2000 from a point east, and that the money would be here to-day. He also said that the manufacturers of other cities are paying into the Association large amounts of money for the purpose of prolonging the strike here to such a length as would very materially damage the iron trade in this city. Having drawn the Pittsburgh trade to themselves, they would be much benefited by the losses sustained by our iron firms. The same gentleman said that the next payment from the Association would probably be as much as \$20 per man, and it would include all men 'out,' union or non-union, as long as they remained out.

The recently adopted scale of wages in Pittsburgh window-glass houses has been signed by representatives of the Western Window Glass Association, and the Window Glass Blowers' Union. Substantially, the rates are nearly the same as last year. The manufacturers have no further guarantee that the scale will be signed in the East than they had last season, but it is generally be-

lieved among them that the Eastern men will be obliged to put their names to the scale, and thus end the inequality which has caused so much trouble in the past.

The Amalgamated Association publish the following official account of their recent convention: The seventh annual convention of the Amalgamated Association adjourned sine die at Chicago, on Thursday, August 10, at 1.40 p. m. The next convention will be held in the city of Philadelphia in August, 1883. The one just closed was the largest and longest in the history of the society, and it adjourned with a better code of laws for the government of the association than ever existed. The sessions throughout were very harmonious, and nothing occurred that would indicate that there were two factions in the society, as certain newspapers would have the public believe. As a guarantee that no further advances will be asked on the base of the puddlers and nailers' scales for some time to come, the convention passed a resolution giving each of those branches privileges to agree with the manufacturers not to change the base for five years if the latter so desired. This, however, will not change the established custom of having the scale signed from June till June. The five-year agreement, however, does not apply to St. Louis and that section, which is now put into a district by itself, and will be hereafter known as the fifth district. But very little was said with reference to the present big strike, except to pass a ringing resolution endorsing the action of the district and pledging themselves to stand by all their fellow members now on strike, whether for the strike or otherwise.

The geographical status of the districts, as reported by the committee on redistricting, and adopted by the convention, is: First district is to remain as it was, and also the second district. What was last year the first division of the third district is now the third district. The fourth district is the same, except that Wyandotte and Detroit are now placed in the sixth district. What was last year known as the second division of the third district (St. Louis, Contralia, Windsor, Belleville, Terre Haute and Green-castle) will hereafter be known as the fifth district. To the sixth district Detroit and Wyandotte are added. To the eighth district the lodges in Massachusetts and Maine are added. The other isolated lodges still remain under the jurisdiction of the president and trustees of the National Lodge.

On Tuesday, August 15, a convention of the Pittsburgh miners was held as previously announced. Forty-six pits were represented. The following is the substance of its action: In the afternoon the report of the Committee on resolutions was fully discussed, each representative instructed giving the condition, views and feelings of his constituents. After all had dilated, the officers gave their opinions on the question, and at 5 p. m. a vote was taken and the following resolutions were carried:

1. Resolved, That the resistance to the reduction be continued until the 4 cents is conceded and all the old hands receive their work.
2. That the thanks of this district are due and are hereby tendered to all who have contributed to our assistance, and that we ask them to continue their contributions until the struggle is over.
3. That all the pits in the district at once send all the cash they can get to the general office to carry on the struggle.

ADJOURNED.

Passenger Car Conveniences.—As an

evidence of the progress made in car building and of the willingness of railroad managers to provide all reasonable conveniences to their passengers, it may be mentioned that the Fitchburg Railroad is at present building some fine new passenger cars, into which a novelty is to be introduced. On one side of the car will be placed a lavatory, consisting of a marble slab with a set bowl. Beneath it there will be a cylindrical tank, containing water under 40 pounds pressure, derived from the air-brake system of the train, and connected by pipes and faucets with the water-closet and wash-basin. Connected with this tank there will also be 50 feet of hose, which can be instantly utilized for extinguishing fires in the car or elsewhere near by. The tank will be filled with water either from a hydrant or by buckets from the outside of the car. In cases where the air-brake system is not in use by a railroad, an air pump may be used to supply the requisite pressure. When conveniences of this kind are generally introduced in passenger cars, much of the nuisances and trouble will be reduced, and a journey will become a luxury where now it is quite the reverse.

IF DEALERS WILL LOOK INTO THIS MATTER OF

JACK SCREWS,

They will find that ours are much better made than any others in market. And furthermore, that by weight they are the cheapest. The same is true of our Bench Vises. We could cut down the weight one-quarter and it would hardly be noticed, but in using the Jacks under great strain somebody might get hurt. It is better for all concerned to make reliable goods, and sell them at a price based on quality, so that when they are put on the market they will stay. We guarantee the quality of all our goods, so that dealers take no risk whatever.

Diam. of Screw.	Height.	Net rise.	Whole height.	List Price.
1 1/4 inches.	10 inches.	4 inches.	10 inches.	\$2.50
1 1/2 "	10 "	5 "	11 "	3.00
1 3/4 "	10 "	6 "	12 "	3.75
2 "	10 "	7 "	13 "	4.00
2 1/4 "	10 "	8 "	14 "	4.25
2 1/2 "	10 "	9 "	15 "	4.50
2 3/4 "	10 "	10 "	16 "	5.00
3 "	10 "	11 "	17 "	5.50
3 1/4 "	10 "	12 "	18 "	6.00
3 1/2 "	10 "	13 "	19 "	7.00
3 3/4 "	10 "	14 "	20 "	8.00
4 "	10 "	15 "	21 "	11.00
4 1/4 "	10 "	16 "	22 "	13.00
4 1/2 "	10 "	17 "	23 "	
4 3/4 "	10 "	18 "	24 "	

MILLERS FALLS COMPANY
74 Chambers St., New York.

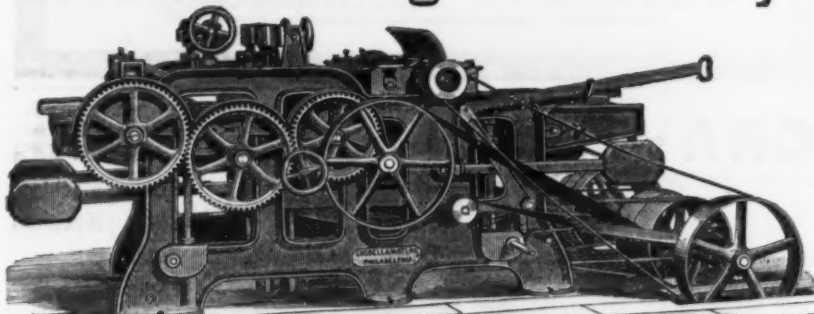
CHAMPLAIN**Forged Horse Nails.**

MANUFACTURED BY THE

NATIONAL HORSE NAIL CO.,
Vergennes, Vermont.

HOT FORGED AND COLD HAMMERED POINTED, MADE OF BEST NORWAY IRON AND WARRANTED.

WAREHOUSE

97 CHAMBERS AND 81 READE STREETS, NEW YORK.
DURRIE & McCARTY, Sole Agents.**Wood-Working Machinery.**

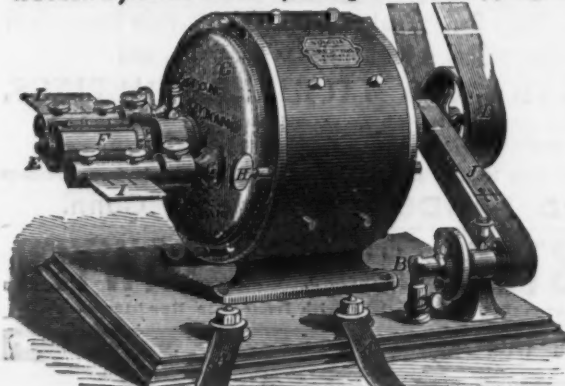
HEAVY FOUR-SIDED CAR SILL PLANERS,
For Planing Mills, Railroad Shops, Car Builders, Cabinet, Carriage, Sash, Door and Blind Makers.

GOODSELL & WATERS,

SEND FOR CIRCULAR.

Thirty-first and Chestnut Streets, Philadelphia, Pa.

HANSON & VAN WINKLE, Sole Agents for
Weston Dynamo Electroplating & Electrotyping Machines, Newark, N. J.



For Nickel, Bronze, Brass, Copper and Silver Plating.
Over 1000 machines in use. Are used by all leading stove manufacturers.
Experienced men sent to put up machines and instruct purchasers.

INFRINGEMENTS.
We call attention to infringements of the Weston Machine in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

MANUFACTURERS OF
Cast Nickel Anodes, Pure Nickel Salts, Polishing Materials.

Manufactory, Newark, N. J. New York Office, 92 & 94 Liberty St.

TO THE WHOLESALE AND JOBBING HARDWARE TRADE.

Send for descriptive Circular and Catalogue of

"THE KING" LEMON SQUEEZER.
AND OTHER HARDWARE SPECIALTIES.

EXTRA HEAVY GLASS BOWL.

**KYSER & REX,**
Variety Iron Works.

Manufacturers of HARDWARE SPECIALTIES, IRON TOYS, NOVELTIES and HOUSE FURNISHING HARDWARE.

Main Office and Factory, FRANKFORD, PHILA. Sample Office, 33 South 4th St. Phila.

CHARLES H. HOWELL & CO.,

MANUFACTURERS OF

BLACK IRON VARNISHES.

PAINT WORKS,

VARNISH WORKS,

212, 214 & 216 Race Street.

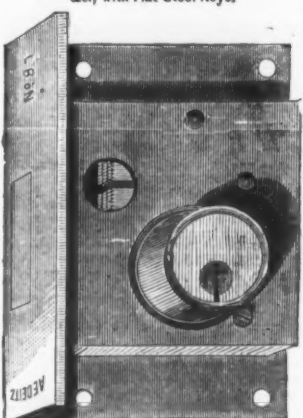
Kensington, Philadelphia.

A. E. DIETZ,

(Successor to Barnes & Deitz.)

Manufacturer of

Store Door Locks, Night Latches, Padlocks, Drawer Locks &c., with Flat Steel Keys.



Durrie & McCarty, Agents,
97 Chambers & 81 Reade Sts., New York.

THE FORSYTH SCALE CO.,
YOUNGSTOWN, O.,

Manufacture a full line of

FORSYTH'S STANDARD SCALES
Counter, Portable, Dormant,

Stock and Hay, and

R. R. Track

SCALES.

Call Special Attention to their

SUSPENSION HAY & R. R. TRACK SCALES.

Also, Warehouse Trucks and Letter Presses.

PRINCIPAL WAREHOUSES,

FORSYTH SCALE CO., Chicago;

SIMMONS HARDWARE CO., St. Louis.

PRIZE MEDALLISTS:

Exhibitions of 1862, 1865, 1867, 1872, 1873, and only award and medal for Noiseless Steel Shutters at Philadelphia, 1876; Paris, 1878, and Melbourne, 1881.

CLARK, BUNNETT & CO., LIMITED,

Late CLARK & COMPANY,

Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving STEEL SHUTTERS,

FIRE AND BURGLAR PROOF. ALSO IMPROVED

ROLLING WOOD SHUTTERS,

Of various kinds. And Patent

METALLIC VENETIAN BLINDS.

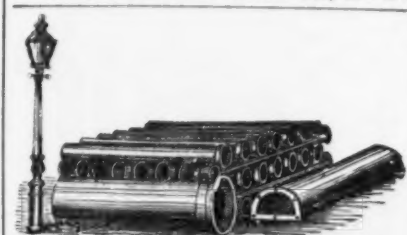
Endorsed by the

Leading Architects of the World.

Send for Catalogue.

Office and Manufactory,

162 & 164 West 27th St., N. Y.



R. D. WOOD & CO.,
Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS,

Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

TINIUS OLSEN & CO.,
STANDARD SCALES

AND

Testing Machines.

Manufacturers of all descriptions of Testing Machines. Tests made daily.

Office and Works, N. W. cor. 19th and Buttonwood Sts., Philadelphia.

HOWARD IRON WORKS,
BUFFALO, N. Y.,

Manufacturers of

BOLT CUTTERS

AND NUT TAPPING MACHINES,

(Schlenker's Patent.)

Send for Illustrated Catalogue

Whitman's Patent Americus.

The best Cider and Wine Mill made. Will make twenty per cent. more cider than any other.

Perfectly Adjustable.

Geared outside.

Prices as low as any first-class mill. Mrs. of Horse-Powers, Corn Shellers, Feed Cutters, Feed Mills, etc.

Send for circulars and prices.

WHITMAN AGRICULTURAL CO.
St. Louis, Mo.

3 SIZES

L. COES'
Genuine and Mechanics
PATENT

Screw Wrenches

MANUFACTURED BY

L. COES & CO.,

Worcester, Mass.

ESTABLISHED IN 1839.



Our Genuine Wrenches are made with straight bars, full width and enlarged jaw, having ribs cast inside, which strengthen the jaw and give a full bearing on front of bar. These improvements, in combination with our new ferrule, made with double bearings, an iron tube, fitted to the shank and resting against the lower bearings, rigidly held in position by the handle and nut, effectually preventing back thrust of ferrule (see sectional view), verify our claim that we manufacture the heaviest and strongest Wrench in the market. None genuine unless stamped

L. COES & CO.,

Worcester, Mass.

Warehouse,

97 Chambers and 81 Reade Sts., NEW YORK.

DURRIE & McCARTY,

Sole Agents.

THE 1882 PENNSYLVANIA LAWN MOWER

Outstrips All Competitors. Premiums Taken Over All Other Mowers.

Every Machine Warranted to Work as Represented.



ALSO MANUFACTURE THE

Best 10-Inch Forward Cut Lawn Mower in the Market, named "Quaker City."

For descriptive catalogue and prices write to

LLOYD SUPPLEE & WALTON, Philadelphia.

DURRIE & McCARTY, New York.

AMES PLOW CO., Boston, Mass.

PRATT & CO., Buffalo, N. Y.

SIMMONS HARDWARE CO., St. Louis, Mo.

HAMILTON & MATTHEWS, Rochester, N. Y.

MARKLEY, ALLING & CO., Chicago, Ill.

HUNTINGTON, HOPKINS & CO.,

Sacramento & San Francisco, Cal.

A. E. BONSTEEL, Troy, N. Y.

H. MITHOFF & CO., Columbus, Ohio.

CULTER, HOLDREGE & CO., Peoria, Ill.

DUCHARME, FLETCHER & CO., Detroit, Mich.

LOCKWOOD, VANDORN & TAYLOR, Cleveland

ANDERSON HARDWARE CO., Indianapolis, Ind.

WM. FRANKFURTH & CO., Milwaukee, Wis.

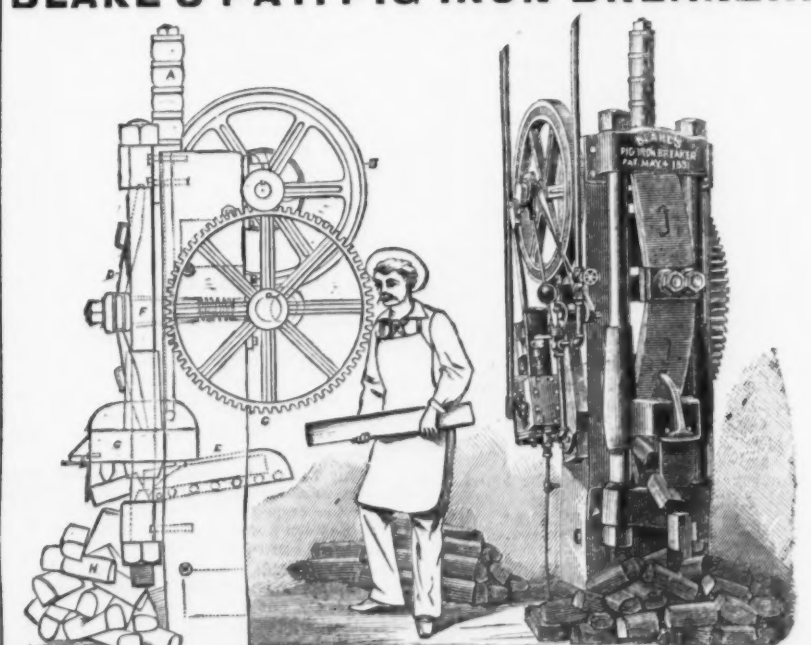
WALTER S. LUDLOW, Cincinnati, Ohio.

LLOYD & CLARKE, La Crosse, Wis.

T. M. CLARKE & CO., Atlanta, Ga.

A. E. BONSTEEL, Troy, N. Y.

H. MITHOFF & CO., Columbus, Ohio.

BLAKE'S PAT. PIC IRON BREAKER.

A new and successful machine for breaking pig iron into any length desired, with rapidity and economy. Besides saving in cost of breaking by hand, it secures the greatest economy in melting. Several machines already in use. Every machine guaranteed against breakage of parts. Requires but three horse-power. Can be run by belt or have small engine attached.

Send for Circulars, Prices, &c.

BLAKE CRUSHER COMPANY,

Sole Makers, 85 Orange Street, NEW HAVEN, CONN.

PHILADELPHIA SCREW CO., Limited,
Twelfth and Buttonwood Streets, PHILADELPHIA.

Manufacturers of

IRON & BRASS WOOD SCREWS.

Quality, finish and tests as to strength guaranteed equal to any in the market.

With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts. A full line in stock.



TRADE PUBLICATIONS.

Railway and Telegraph Supplies.

Messrs. L. G. Tillotson & Co., of Nos. 5 and 7 Dey street, this city, have just issued a handsome and very elaborate catalogue of railway and telegraph supplies. It is 10 by 13 inches in size and comprises 326 pages in all. It opens with a very complete list of all kinds of hardware, including not only such things as sash locks, blind lifts, bars and deck sash fixtures, but also the more unusual brasswork connected with sleeping and palace cars. In car locks, especially the more ornamental kinds, a very large and handsome assortment is shown. Faucets, water coolers, and fixtures for the saloons are illustrated, together with a great variety of standard and patented seat fixtures. Passenger, freight, palace and parlor car hardware is completely illustrated. The same is also true of street cars, a separate department being devoted to them. In car lamps for candles, as well as for gas and heavy mineral oil, the list is very large and the styles shown are exceedingly handsome. Head linings, car heaters, lanterns, both hand and signal, globes, upholsterers' material, brushes, head-lights, gauges, valves of all kinds, are freely illustrated and price lists given. Several novelties in hand cars for one, two or three persons are shown. There are also shown a great variety of railroad frogs, crossings, jacks, track gauges, lock nuts, switch stands, and other material relating to the permanent way. The firm also have a large line of goods especially adapted to the repair and machine shops. In fact, not only can they furnish every single thing necessary for a road, but, if required, could furnish a railroad complete with its trains on the track ready for passengers; and perhaps the best and most comprehensive notice which we could give of the catalogue would be to say that they illustrate everything from a No. 3 1/4 wood screw to a complete railroad. One department, however, we should not omit to call attention to, and that is the telegraphic instruments and supplies. Of this, however, they find space for a comparatively small list, that department of the business having a catalogue by itself. They make or have on hand everything in the way of telegraphic work, from a registering sounder in a glass case to line wire and insulators. They also have a very complete line of annunciators, burglar alarms and fine telegraph instruments.

Engineers' Club of Philadelphia.

Number two of the proceedings of the Engineers' Club, of Philadelphia, for this year is at hand. The number is of unusual interest. The leading article is by Baermann, "On the thickness of Iron Pipe Under Pressure." The number is illustrated with a photograph by Gutekunst, of Mr. Louis M. Haupt, who was president of the club during its first year. An interesting little article is given by Mr. Stauffer, on "Brickwork Under Pressure," and a couple of engravings illustrating the points made in the article accompany it. The proceedings of the club are becoming each year more valuable, and form very interesting contributions to current scientific literature.

Electric Bells and Annunciators.

Messrs. J. & W. McKeough, electricians, of Chatham, Ont., have just sent us one of their illustrated catalogues describing their patent electric annunciators for hotels and private residences, fire alarms, burglar alarms, &c. The advantages of these appliances over the old system are briefly set forth, and illustrations are given of the different kinds of bells manufactured by them. Persons intending to make purchases in this direction will find the catalogue convenient in many respects, and should not fail to procure it.

Pennsylvania Fire Clays and Fire Brick.

Mr. H. G. Debrunner, of the Phoenix Roll Works, Pittsburgh, having recently been called upon to perform a number of analyses of fire-clays and fire-brick made from them, communicates several observations, indicating more or less certain relations between the chemical composition of a clay and its behavior at extreme temperatures. As the samples represented a fair average, and as the bricks were made from a portion of the analyzed samples, these investigations perhaps deserve more attention than analyses of extra good selected pieces of clay. Among the most prominent fire-bricks rank undoubtedly the "Woodland" and the "Phoenix," and as from the testimony of consumers it is hard to decide which deserves preference, the following analyses will be found interesting:

	Woodland.	Phoenix.
Per cent.	Per cent.	Per cent.
Silica	49.35	49.03
Alumina	41.04	40.43
Oxide of iron	3.88	3.50
Lime	0.50	2.40
Magnesia	traces	0.10
Sulphuric acid	0.45	1.37
Alkalies	0.14	1.78
Loss	0.03	0.46
Total	100.00	100.00

Titanic acid was absent in both. The "Woodland" sample was obtained by pulverizing coarsely a whole brick, and then selecting a small quantity as an average for analysis. The Phoenix brick was treated in a similar manner. The operation must be performed in a hardened cast-steel mortar, since the extreme hardness of the sample would cause contamination with iron if crushed in an ordinary cast-iron mortar. An analysis of Phoenix clay gave the annexed results:

	Per cent.
Moisture	1.020
Combined water	11.450
Silica	41.957
Alumina	37.423
Oxide of iron	2.508
Magnesia	0.012
Lime	0.818
Sulphuric acid	1.708
Alkalies	1.576
Loss	0.170
Total	100.000

Titanic acid was entirely absent. Another fire-clay and brick from Clearfield County, or its immediate vicinity, showed the following composition:

	Fire-clay.	Fire-brick.
Per cent.	Per cent.	Per cent.
Moisture	1.100	...
Comb. water	12.470	...
Silica	43.500	40.000
Alumina	32.677	40.438
Oxide of iron	4.304	5.580
Lime	1.260	1.450
Magnesia	0.174	0.105
Sulph. acid	1.534	1.311
Alkalies	2.553	2.748
Loss	0.338	0.246
	100.000	100.000

Clays are principally hydrated silicates of alumina, their essential constituents being combined water, silica and alumina. They are, however, constantly, and very frequently to a considerable extent, contaminated with impurities, such as ferric oxide, lime, magnesia and alkalies. The plasticity of a clay depends upon the percentage of combined water, increasing with the same. A pure silicate of alumina is fusible only in the flame of the oxyhydrogen blow-pipe, but most clays are mixtures of the pure silicate with silica or sand. A mechanical analysis of clay by "floating" allows a distinct separation of this admixture. Very frequently clays are a product of decomposition of feldspar, which accounts for the presence of alkalies. Often they contain lime in the shape of a carbonate or silicate. Iron may exist in three different forms in clays, viz., as protoxide, peroxide or disulphide. Titanic acid is not frequently found in clays, and its action on the same is hardly understood. Mr. Debrunner considers it entirely harmless in quantities from 1/2 to 3 per cent. Alkalies, he says, are undoubtedly the most injurious, if present to a large extent, but in quantities of from 1 to 3 per cent. they not only do no harm, but are beneficial, as they produce a slight vitrification of the brick on exposure to extremely high temperatures. This vitrification induced by the presence of alkalies in the above-mentioned quantities, increases the cohesiveness of the brick; in plainer words, it will not fly on rapid cooling. To substantiate this assertion, two fire-bricks of known composition were examined microscopically. No. 1 contained 2.25 per cent. of alkalies, while No. 2 only contained 0.750 per cent., being in other respects of similar composition as No. 1. Both bricks were exposed in an equal manner to the extreme heat of an open-hearth furnace, being placed at the gas resp. air inlet to the combustion chamber. After cooling, fractions of both bricks were examined with a powerful microscope, and it was found that No. 1 exposed a very slightly glazed or "fritted" continuous surface, while No. 2 was perforated with a large number of channels or cracks.

Mr. Debrunner states that No. 1 deserves preference for use in a crucible gas furnace, which runs six or eight weeks without interruption, while No. 2 would "fly," as was shown by actual trials. As the temperature of the brick kiln is by no means equal to that to which the brick is exposed in the furnace afterward, there is a certain amount of contraction or "shrinkage" left in the brick when ready for market. On exposure to higher temperatures than it had been in before it contracts anew, and crumbles or flies on cooling, provided a small percentage of alkalies does not cause a vitrification or agglutination of its particles. From this standpoint the alkalies of clays appear in a better light than ever heretofore. Protoxide of iron, and also the bisulphide, are considered more dangerous, if present to the same or a larger extent, than the alkalies. Lime and magnesia are not desirable in quantities over 2 per cent., while sulphuric acid must be considered a product of decomposition of bisulphide of iron. As to these latter impurities, Mr. Debrunner has not yet been able to accumulate sufficient evidence to fully condemn them, and leaves it to further and future experiment to learn their influence.

Large Belts.—Messrs. P. Jewell & Sons, of Hartford, Conn., have acquired an enviable reputation for making large belts. According to an item in the Buffalo Express, the largest belt ever made from a single width of hide was recently produced by this firm for a New York flouring mill. It was 48 inches wide, 96 feet long, and weighed 1000 pounds. We learn that this firm are at present making two belts larger than the above, to be used in one of the largest rubber factories in the country. One is 48 inches wide and 120 feet long, and the other 44 inches wide and 150 feet long, both double thickness. These are the largest belts that can be made from a single hide, as no hide can be solid and thick more than 4 feet in width. It is comparatively few years since belts of these proportions could be made, or pulleys on which to run them. No country except the United States is making use of articles of this kind of the dimensions given.

The Tariff in California.—According to the San Francisco Chronicle, California is, in some respects, even more interested than the Eastern States in the final settlement of the tariff controversy, as her manufacturing industry is still in its infancy, and to build it up under the free trade system would be altogether out of the question. Without protection, too, her best-paying farming industries—wool and wine—would languish, and their great possibilities, of which the world has heard so much, would have to be relegated to a far distant future. Besides, California is within easier reach of India and China, whose manufactured products, at their present rate of increase, might be expected in the course of a few years to take full possession of any market left open to them on this coast.

IRON AND METAL Exchange Memberships

Bought and Sold by
WM. WILLIS MERRILL,
4 Stone Street, Room 69,
Dealer in

EXCHANGE MEMBERSHIPS.

HAVING ENLARGED OUR
Facilities for the Manufacture of Nickel
Plated Steel Shears,

we invite the attention of the trade to our goods, which we warrant equal in quality to any in the market and on which we are prepared to quote reasonable prices. We also make a line of cheap nickel plated shears, which work well and are quick selling goods. Send for prices.
NORWICH LOCK MFG. CO., Norwich, Conn.

AN IMPROVED LEVELING INSTRUMENT.



Adapted to the use of Architects, Engineers, Masons, Builders, Farmers and others.
This instrument is made of Brass, furnished with both mason's (short metal) and surveyor's tripod, and put up in a handsome wooden box, with handle. The only low-priced level that can be thoroughly adjusted in the field.

A NEW LEVELING ROD.
This rod is round and made in two sections; is united by a solid screw joint, as if of one length, and has a target. There are two scales; one side being Engineers' (feet, 10ths and 100ths) the other Architects' scale (or, feet, inches and sixths). Price, \$6.
WM. T. COMSTOCK, Manufacturer,
6 Astor Place, New York.
Circulars and discount to hardware trade furnished to dealers sending their card.

GEO. B. CARPENTER & CO. DEALERS IN

SUPPLIES FOR ROLLING MILLS MANUFACTORIES MINING & RAILWAYS

WESTERN AGENTS FOR
H.W. JOHNS'

ASBESTOS LIQUID PAINTS

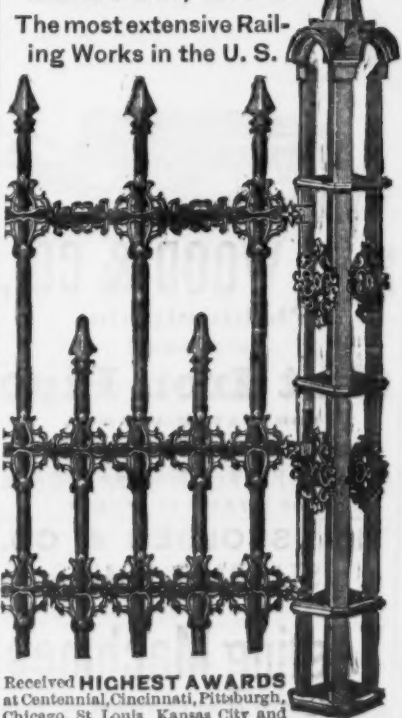
STEAM PACKING, MILL BOARDS
ROOFING, BOILER COVERING
GASKETS, FIRE PROOF COATINGS

CEMENTS & C.
SEND FOR CIRCULARS
202 & 208 S. WATER ST. CHICAGO.

MENTION THIS PAPER

CHAMPION IRON FENCE CO.

KENTON, OHIO.
The most extensive Rail-
ing Works in the U. S.



Received HIGHEST AWARDS
at Centennial, Cincinnati, Pittsburgh,
Chicago, St. Louis, Kansas City and
Atlanta Expositions. Diplomas at Detroit, Toron-
to, Canada; Springfield, Ill., and other State Fairs.
ALSO MANUFACTURE THE CELEBRATED
OHIO CHAMPION FORCE PUMP
BEST PUMP MADE!
Located at Kenton, to avoid City expenses.
Send for Illustrated Catalogue (75 pages).

E. BISSELL & CO., Wholesale Hardware Auctioneers,

83 Chambers and 65 Reade St., N. Y.

Sales held weekly for the trade. Consignments solicited. We refer to the leading Manufacturers and Importers.

ROBERT R. HAYDOCK & CO., AUCTIONEERS,

No. 75 Murray Street, New York,

SOLICIT CONSIGNMENTS OF
HARDWARE, CUTLERY, &c.

RECISTERS AND VENTILATORS.

MOORISH STYLE.

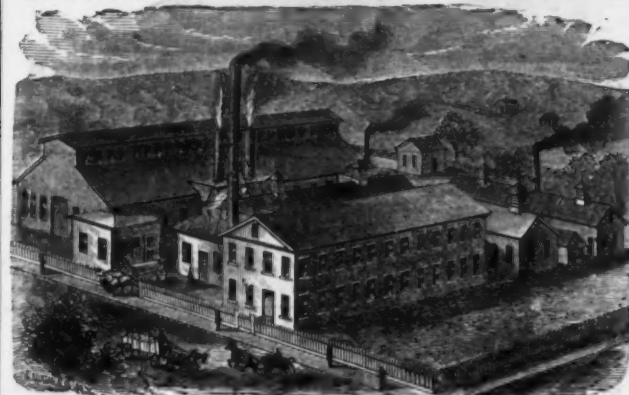
12 x 14 Register and Frame.

NEW STYLES
AND
NEW MOVEMENTS.

PHILADELPHIA.

STOVE BOARDS, MICA, RUSSIA IRON, RIVETS, ETC.

MANUFACTURERS OF GRAY IRON CASTINGS,



Sewing Machine,
Fluting Machine,
Pumps,
Lamp Posts,
Hitching Posts,
Bed Iron,
Well Fixtures,
Mantel Frames
AND
Summer Pieces,
Grates,
Sinks,

Valves and Valve Wheels, Whip Spikes, Patent Sash Weights, Axle Boxes (Soft and Chilled), Opera Chairs, School House Furniture, and

ALL KINDS LATHE AND MACHINERY CASTINGS,

Building Columns and Brackets, Sash Locks, and all descriptions of

FINE CASTINGS AT LOW PRICES.

We have two cupolas and run two kinds of iron.

Patterns made from drawings

PARSONS & LANDON, Bridgeport, Conn.

J. H. WEBSTER, 111 Bank St., CLEVELAND, OHIO. LAWYER.

Prompt Personal Attention to Collections with Immediate Remittance.

Self-Binders for The Iron Age.



We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to
DAVID WILLIAMS,
83 Reade street, New York.

HUGONIN'S (Patent) Improved WINDOW SUPPORTS.
Sizes for 35 lb. Sashes and under. Applied at half the cost of applied weights. BEWARE OF A FRAUDULENT IMITATION handled by irresponsible parties, and avoid future trouble for infringement. The reliable, genuine goods are only made by the inventor and patentee.
ROBT. B. HUGONIN,
Hartford, Conn. U. S.

HUBBELL'S
PATENT
METAL
CORNERS
FOR OIL CLOTH,
With Binding to Match.

RAY HUBBELL,
Patentee and Sole Manuf'r in U. S. and Canada.
Northville, Fulton Co., N. Y.

PAINE & LADD,
HALBERT E. PAINE,
Late Comm'r Patents.
STORY R. LADD,
Solicitors of Patents and Attorneys in Patent Cases.
D. C. WASHINGTON.

EVERY RETAIL STOVE OR HARDWARE HOUSE IN THE U. S. CAN EASILY SELL DURING THE SEASON ONE OR MORE GROSS OF

THE
Recognized Standard of the World for Cleaning the
Nickel Plates on Modern Stoves,

Upon many of which there is more Nickel than iron surface to clean. It is also sold
with the guarantee that it is the

BEST AND QUICKEST CLEANER OF SILVERWARE EVER PRODUCED.
PAYS 50 PER CENT. PROFIT.

Price, Per Dozen, \$2. Retail at 25 Cents Per Bottle.
ORDER FROM THE WHOLESALE HOUSES.

MANUFACTURED ONLY BY

THE LUSTRO CO.,

171 Duane Street, New York.

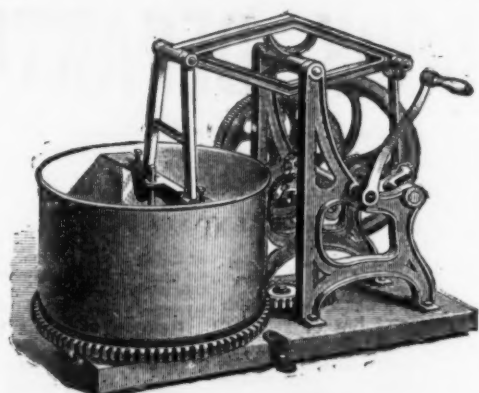
FRED. W. GARDNER, President.

JOHN T. BROWN, Treasurer.

BEWARE OF IMITATIONS.

IMPROVED
AMERICAN MEAT CHOPPER,

SEVEN



SIZES.

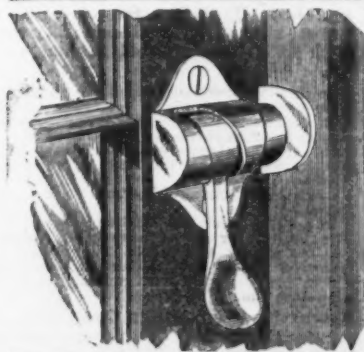
For Butchers and Family Use.

The only Chopper yet invented that has proved an unqualified success.

ATHOL MACHINE CO., Athol, Mass.,

SOLE MANUFACTURERS.

Send for Price List.



HYDE, AYER & CO.,

Sole Manufacturers of the

**Practical
WINDOW SASH FASTENER
AND LOCK COMBINED.**

Holds the Window at any point, prevents all rattling,
and locks the same when down.

**Practical Clothes Line Holder,
AND PATENT SPECIALTIES.**

Stoddard's Combined Dividers and Calipers, Improved
Inside and Outside Calipers, Tools, &c., &c.

SPRINGFIELD, - - - MASS.

HANDLES FOR MANUFACTURERS.

From Selected Stock, Thoroughly Seasoned, Well Made.

Orders solicited from close buyers who want good work.

RIPLEY MANUFACTURING CO.,

Unionville, Conn.,

Manufacturers of

"Common Sense" Mouse Traps, Mallets, Porcelain-Lined
Lemon Squeezers, Boot Jacks, Faucets and Hardware.

The Boss Lemon Squeezer.

Malleable Iron and
Tinned (pure Tin).



Acknowledged the Best.

Patent Applied For.

JOHN J. TOWER, 96 Chambers St., New York.

ORDER EARLY.

SABIN MFG. CO.,

MONTPELIER, VT., MANUFACTURERS OF

DOUBLE-ACTING SPRING BUTTS,

SABIN'S LEVER DOOR SPRINGS, For heavy doors,

BOSS AND CROWN SPRINGS, For light doors.

Send for Catalogue.

FIRE SHOVELS AND POKERS.

WHEELING HINGE CO.,

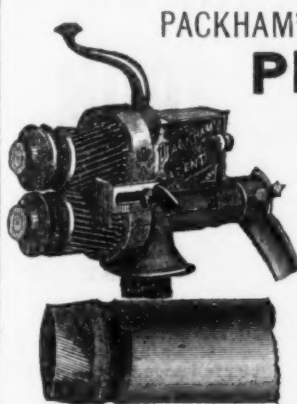
WHEELING, W. VA.

PACKHAM CRIMPER CO.,

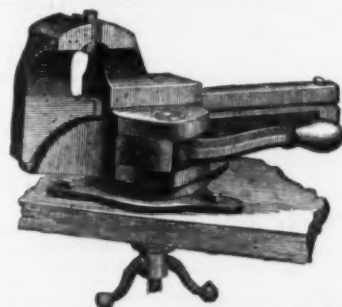
MECHANICSBURG, OHIO,

MAKERS OF

**PACKHAM'S PATENT STOVE AND CONDUCTOR
PIPE CRIMPER.**



SOLE BY
R. SELLEW & CO., St. Louis, Mo.,
WM. BLAIR & CO., Chicago, Ill.,
HOLBROOK, MERRITT & STETSON, N. Y. and San Francisco,
MERCHANT & CO., Philadelphia and New York,
GEO. WORTHINGTON & CO., Cleveland, Ohio,
LYON, CONKLIN & CO., Baltimore, Md.,
F. H. LAWSON & CO., Cincinnati, Ohio,
DUCHEME, FLETCHER & CO., Detroit, Mich.,
JOHN DUNLAP, Pittsburgh, Pa.,
KERN & HAGGERTY, Baltimore, Md.,
MIDNEY SHEPARD & CO., Buffalo, and Chicago, Ill.,
TURNER, SULLIVAN & TALBOT, Indianapolis, Ind.,
WILLIAM FULLER & CO., Baltimore, Md.,
RICE, BORN & CO., New Orleans, La.,
HIBBARD, SPENCER & CO., Chicago, Ill.,
BRIDGE BEACH MFG. CO., St. Louis, Mo.,
CHICAGO STAMPING CO., Chicago, Ill.,
GOLDSMITH & LOWENBERG, Portland, Oregon,
HALL & WILLIS HARDWARE CO., Kansas City, Mo.,
E. H. HUENFELD, Cincinnati, Ohio,
MILTON ROGERS & CO., Omaha, Neb.,
M. & L. SAMUEL BENJAMIN, Toronto, Canada,
FREDERICK BRADY, Pittsford Works, London, England.
LIBERAL DISCOUNT TO THE TRADE.



**STEPHENS
PATENT VISE.**

The most durable, and the only solid quick-
working Vise, with automatic taper jaw at-
tachment.

Will very soon pay for itself, in saving of
time and labor.

For sale by the trade.

OFFICE:

41 Dey St., New York, U. S. A.

A. NORTHROP & CO.,

MANUFACTURERS OF

Northrop's Patent Cap Seam Iron Roofing,

In Sheets, Boxed or Rolls.

Northrop's Pat. Paneled and Crimped Ceilings.

Fire Proof and Highly Ornamental.

CRIMPED IRONS FOR ROOFING AND SIDING, OF VARIOUS STYLES.

Mill owners, or parties who make or buy their own iron, can have it crimped at the mill or where wanted
at small cost.

Send for Circulars.

No. 97 First Ave., PITTSBURGH, PA.

**RIVERSIDE
FOUNDRY
WORKS.**

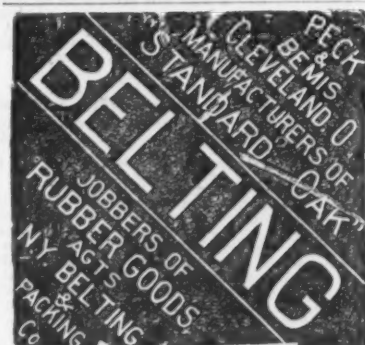
**ROLLING MILL AND MACHINERY
CASTINGS, ROLLS, INGOT.**

CLEVELAND, OHIO.

**MOLDS, ANNEALING POTS, HOT
BLAST PIPE, &c.**

**BARREL AND STAVE
MACHINERY.**

The best in the world.
For circulars, address
H. A. CROSSLEY,
CLEVELAND, O.



HOWLAND'S PATENT
ROAD SCRAPER
will do the work
of 30 men.

IT IS EQUAL TO 15 REVOLVING SCRAPERS,
R. S. Dorsey, Manufacturer, Indianapolis, Ind.

UNION BOLT AND NUT WORKS.

THOMAS PARKES,

MANUFACTURER OF

MACHINE BOLTS, NUTS AND RIVETS

Of All Kinds.

Office and Works.

204, 206 & 208 Chicago St., BUFFALO, N. Y.

LOCKWOOD MFG. CO.,

SOUTH NORWALK, CONN.,

MANUFACTURERS OF

**LIGHT GRAY IRON
CASTINGS.**

Metal Patterns,

Iron Toys and

Hardware Specialties

Illustrated Catalogue of
Iron Toys sent on applica-
tion.



LEVER

Lemon Squeezer,

With perforated strainer. It
will squeeze one-third more
juice from a lemon than any
other, also quicker.



R. Onderdonk.



**THE "EDDY" STRAIGHTWAY
VALVES.**

ALSO

FIRE HYDRANTS.

Ars, Hatchets, Powder and

Brush Machinery.

THE EDDY VALVE COMPANY,

WATERFORD, N. Y.

BENTON, FAULKNER & BIRD, N. Y. Agents

C. H. & W. H. MIDDLETON Phila. Agents.

**PATENTED ARTICLES
OF
MALLEABLE IRON.**

Hammer's Adjustable Clamps.



Hammer's Malleable Iron Oilers, 3 Sizes.

Hammer's Mail Iron Hand Lamps.

Hammer's M. I. Hanging Lamps.

NEW pattern Heavy Screw Clamps;

strongest in the market.

For sale by all the principal Hardware dealers.

Send for Price List.

Malleable Iron Castings

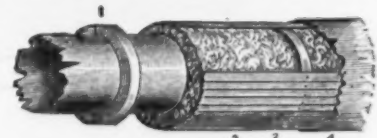
Of superior quality and Hardware Specialties in

Malleable Iron made to order.

HAMMER & CO.,

BRANFORD, CONN.

Mineral Wool.



A fibrous material, encasing about 90 per
cent. of its volume of air, and therefore a
superior

NON-CONDUCTOR

OF

HEAT AND SOUND.

Being made from the slag of blast furnaces,
it is fire-proof and durable in contact with
heated surfaces. Readily applied.

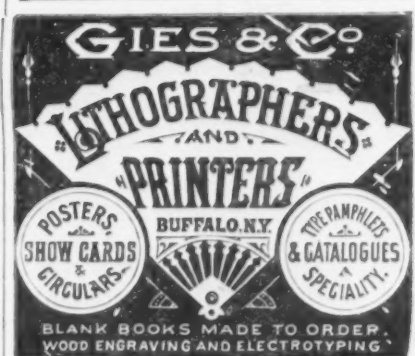
Ordinary Grade, 24 lbs. per cubic foot.

Extra Grade, 14 lbs. per cubic foot.

Circular and Sample free by mail.

U. S. MINERAL WOOL CO.,

16 Cortlandt St., New York.



Grant Fan Mill & Cradle Co.

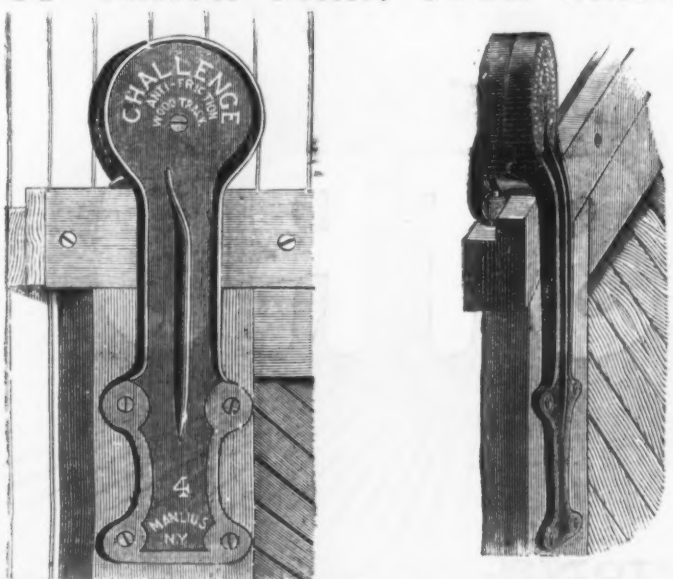
Manufacturers of

Grant's Grain, Coffee, Rice, Cochineal
and Pimento Fans,



TURKEY WING GRAIN CRADLES,
4, 5 and 6 Hangers.
GRAPE VINE GRAIN CRADLES
4 Hangers.
SOUTHERN PATTERN GRAIN
CRADLES.
4, 5 and 6 Hangers.
All of a superior quality.
None genuine unless marked
Grant Fan Mill & Cradle Co.
Send for illustrated catalogue
and price list.
P. O. Address,
MELROSE, Rensselaer Co. N. Y.

THE IMPROVED CHALLENGE ANTI-FRICTION WOOD TRACK BARN DOOR HANGER.



Patented October 6th, 1874, October 26th, 1875, and January 17th, 1882.

No thing has ever been introduced that combines so many good qualities as does this. It is the most perfect Anti-Friction Hanger ever invented. It is heavy, strong and durable. It is easily put up and has no side friction, and it is impossible for the door to be thrown off the track. It is admired by all who see it, and is the best selling Hanger in the market. Send for circular and price list. Address

E. U. SCOVILLE, Patentee and Sole Manufacturer,
MANLIUS, N. Y.
Or **FELIX D. BERTHET, Sole Agent, 82 Chambers St., New York.**

PERFORATED SHEET METALS.



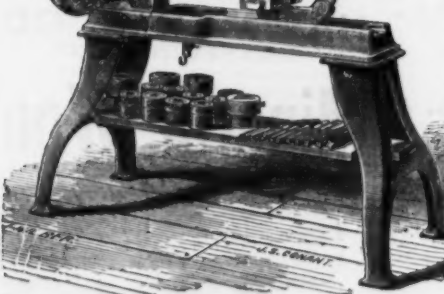
FOR ALL USES.
Light or heavy work in Iron, Steel, Brass or Tin Plates.
Perforated Zinc, Sheet Iron, for Mill Jacket, Thrashers, Separators, Corn Shellers, and all kinds of Grain Cleaning Machinery; also for Mining and Concentrating Works, Coal, Coke and Ore Screens, Gas and Water Works, Paper, Woollen and Flour Mills, Filters, Strainers, Ventilators, etc. PERFORATED TIN AND BRASS of all sizes. Iron, Steel, Copper, Brass and Zinc Punched to any size required. Special Attention given to Work for Railroads and Car-Builder. Special discounts to the trade. Correspondence solicited.

Harrington & Oglesby Co.,
Nos. 43, 45 & 47 South Jefferson St.,
CHICAGO, ILL.
New York Office, No. 95 Liberty St.

WILEY & RUSSELL MFG. CO.,

Greenfield, Mass.

LIGHTNING SCREW CUTTING MACHINERY AND TOOLS.



Bolt Cutters for Hand or Power.
Celebrated Lightning Screw Plates, cutting from wire size to 1 1/2 inch. Lightning Taps, Dies and Reamers for use in the Bit Brace.
Pipe Taps and Dies.
Green River Drills, hand or power.
" Tire Benders.
" "Upsetter's".
" Horse Shoos' Vises.
Green River Punching Presses.
Tire Wheels, Tire Bolt Wrenches, &c.

Send for Illustrated Price List.



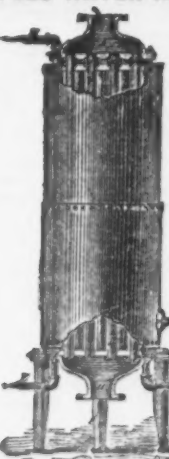
THE 'RAPID TRANSIT' TRAP

Has no superior, and is a sure and certain catcher of Mice. With the Metal Platform resting on wood bottom of Trap, an invitation is always extended to Mice of whatever "kind, color or condition of race," into secure and grated quarters, from which they are released by opening cover of Trap and depositing contents into a pail of water.

The Mice go in at a rapid rate, and each one sets it for his mate.

Patented August 27, 1878. MANUFACTURED BY
THE SMITH & EGGE MANUFACTURING CO., Bridgeport, Conn.
Agents, **FLAGER, FORSYTH & BRADLEY** 298 Broadway, New York.

THE LOWE PATENT FEED WATER HEATER & PURIFIER,



FOR
Heating and Purifying Water for Steam Boilers.
Patented July 12, 1877.
Has Straight Tubes.
SIMPLICITY.
RELIABILITY and EFFICIENCY
At Less Cost Than any other.
Write for prices and further information to the manufacturers.
Lowe & Watson,
BRIDGEPORT, CONN.

CUTTERS WILL NOT BREAK.

THE DERBY BIT CO

ANSONIA, CONN.

DURABLE, STRONG, CONVENIENT

HOLIDAY GOODS.



The above cut represents our

IMPROVED CHILD'S WAGON.

Tire made out of Oval Iron. Spokes Tinned Steel, Initiating Nickel Plate. Secured to a Steel Axle with Iron Bearings. Box painted Bright Red, Nicely Striped, making the Strongest, Lightest Running Wagon offered to the trade.

For Circulars and Price List of Wagons, Gas pipe and Steel Sleds, Shoo Fly Rokers, Toy and Boy Wagonbarrows, Boy Tricycles and Bicycles, Child's Velocipedes, Gent's Tricycles, &c., &c., Address

THE TRICYCLE MFG. CO.,

Springfield, Ohio.

THE METAL WORKER PATTERN BOOK.

BY A. O. KITTREDGE.

Contains 242 Quarto Pages, 10 by 12 1/2 inches in size. Illustrated with over 500 Line Engravings. Substantially Bound in Cloth, with Gilt Side Title.

This work has been prepared in response to a well-defined demand, upon the part of Tinners and Cornice Makers, for a better and more comprehensive exposition of the principles of pattern cutting, as applied to Sheet-Metal Work, than anything heretofore published. The work is comprised in five general divisions or chapters. First, Definitions and Technicalities, in which are explained the various mathematical and mechanical terms which it has been found necessary to use in the book, and which are current among mechanics, and such architectural terms as are commonly employed in cornice shops have been defined. Second, Drawing Tools and Materials, comprising practical directions for those who commence drawing as a preliminary step to pattern cutting. Third, Geometrical Problems, presenting a course in practical geometry, and showing the various ways of solving the same problem, and the use of different instruments in accomplishing the same results. This allows the mechanic the widest range of choice in methods. Fourth, comes Art and Science of Pattern Cutting, a theoretical exposition of the principles underlying the operations of pattern cutting, presented in such a way as will enable the student to make intelligent application of them, irrespective of formulated rules. Those who already possess a fair degree of ability as pattern cutters, but who are perplexed when unusual combinations arise, may find in this division of the book all they require to render them proficient. Fifth, and last, is presented Pattern Problems, arranged principally in classes, so that those of a kind will be found together. Each problem, so far as possible, has been demonstrated independently of all others. Arranged in this manner facilitates the occasional use of the book by those who do not care to go through it in course.

The names of some of the ordinary articles of ware made in Tin shops have been included in the index, with references to the rules which may be employed in developing their patterns.

The aim of the author has been to present a work that would prove serviceable alike to the apprentice boy who has no other instruction book; to the mechanic who desires to add to the limited knowledge of pattern cutting he already possesses; to the student who would master the art by systematic research, and to all who have occasional need of assistance in getting over difficult places. It is a book that should be found in every Tin and Cornice shop throughout the length and breadth of the land.

PRICE, POSTAGE OR EXPRESSAGE PAID, \$5.

DAVID WILLIAMS, Publisher and Bookseller, 83 Reade Street, New York.

THE IRON AGE BOOK DEPARTMENT.

Any book published in this country will be mailed, postpaid, at publishers' prices, to any address in the United States or Canada. Orders and inquiries by mail will receive careful and prompt attention.

LIST OF TECHNICAL BOOKS SPECIALLY SELECTED.

Practical Treatise on Casting and Founding. By N. E. Sproston. 412 pages; size, 6 1/4 by 8 1/2 inches; illustrated with 82 full-page plates. Bound in cloth. Price, \$7.

This is one of the more important works covering the whole subject indicated by its title. It embraces a full discussion of all modern English and Continental practice in casting, founding, molding and case hardening. The illustrations show working drawings of cupolas, furnaces, tools, molding machines, pyrometers, cranes, pans, &c. A number of useful tables and notes are also presented. The object of the work has been to collect in one volume every subject on which it is probable that a founder will require information. In whatever material he deals with, and to place that information before him clearly, concisely and in as practical a manner as the subject will allow.

Molders' and Founders' Pocket Guide. By Fred. Overman. 342 pages; size 5 1/2 by 8 inches; illustrated with 44 engravings. Bound in cloth. Price, \$2.

A practical work, devoted to the subject of molding and founding. It treats of molding in green sand, dry sand, loam and cement. The molding of machine frames, and statues is described and illustrated. Following this is presented a description of molds for iron, bronze, brass and other metals; also of taking impressions with glass, sulphur, wax, &c. The construction of melting furnaces, the melting and founding of metals, the composition of alloys and their nature, together with numerous useful tables and recipes, completes the work. To the text is added a supplement on statutory and ornamental molding, ornamental malleable iron castings, &c., &c., by Mr. A. A. Fesquet.

Practical Brass and Iron Founders' Guide. By James Larkin. 301 pages; size, 5 1/2 by 7 1/4 inches. Illustrated. Revised with extensive additions. Bound in cloth. Price, \$2.25.

This is a concise treatise by a practical man, on brass founding and molding. The subject of the properties of metals, together with their alloys, is taken up and quite exhaustively treated. A supplement is devoted to comparatively recent improvements in the manufacture of iron, steel by the Bessemer process, &c. Numerous tables, formulae, recipes, &c., are also included.

Brass Founder's Manual. By Walter Graham. 141 pages; size, 4 1/4 by 7 1/4 inches; illustrated with numerous engravings. Bound in flexible cloth. Price, 85 cents.

This little volume contains instructions for modeling, pattern-making, molding, alloying, turning, filing, burnishing and brazing. Copious receipts and tables are presented, together with notes on prime costs and estimates. Although the book is designed for English practice, it will be found to contain many suggestions that are valuable to brass founders in this country.

The Manufacture of Steel. By Fred. Overman, with appendix containing an account of Recent Improvements in Steel, by A. A. Fesquet. 285 pages; size, 5 by 7 1/4 inches; illustrated with 30 figures. Bound in cloth. Price, \$1.50.

This volume has been prepared with the view of developing the science of manufacturing steel and explain the philosophy of the practical operations. It gives attention to forging in all its branches, hardening and tempering; describes the different varieties of steel, such as Wootz, Damascus and German, together with their qualities and characteristics. General remarks on making steel, nature of steel and the American and English method of making steel are presented. A portion of the book is devoted to the working of steel in the smith's forge, in order to afford a safe guide to the blacksmith who has to work more or less of this material.

Directory to the Iron and Steel Works of the United States. Prepared by the American Iron and Steel Association. 184 pages; size, 6 by 8 1/4 inches. Bound in cloth. Price, \$2.

This work is just what its title indicates. It embraces the blast furnaces, rolling mills, steel works, forges and bloomeries in every State and Territory. The names of establishments are given first, followed by the names of owners and their post office addresses.

Manufacture of Russian Sheet Iron. By John Percy. 23 pages; size, 6 by 9

inches; illustrated with 12 figures. Pamphlet. Price, 50 cents.

This little pamphlet, by a well-known English author, covers the subject of Russian sheet iron manufacture so far as he has been able to collect information. It consists chiefly of a description of various methods of making the sheet iron as practiced by Russian engineers. An appendix is added treating on American sheet iron.

Art of Electro-Metallurgy. By G. Gore. 391 pages; size, 5 by 7 inches; illustrated with 56 engravings. Bound in Cloth. Price, \$2.50.

This is one of the more important works treating on electro-metallurgy. It is divided essentially into four parts or sections. The first presents an historical sketch, showing how, from one or two isolated and apparently unimportant facts, arose the great subject of electro-metallurgy. The second part consists of the theoretical division, being a concise statement of the chief facts and principles upon which the practical art is based. The third part is the first portion of the practical division of the book, and treats of the general methods of deposition, general rules to be obeyed and points to be observed in actual working with all metals. The fourth section is of a more special and technical character, containing a variety of technical points of instruction necessary for the successful prosecution of the art. The book also includes an outline of the science of electro-chemistry, upon which the art of electro-metallurgy is based.

Treatise Relative to the Testing of Water Wheels and Machinery. By James Emerson. 360 pages; size, 5 by 7 1/4 inches; profusely illustrated. Bound in cloth. Price, \$1.

This work is comprised in two divisions. The first part presents a description of various water-wheel tests made by the author, together with tables showing the results obtained. Turbine wheels of different makes are illustrated and briefly described. The second portion of the book is devoted to hydrodynamic experiments, made under the direction of The Holyoke Water Power Company, and presents the detailed report of tests made with a number of turbine water wheels of different manufacture. Valuable wire tables are also introduced. The work supplies a want that can hardly be filled by any text book or treatise, by giving the actual value of the wheels daily sold in the market.

Treatise on Water Works for the Supply of Cities and Towns. By Samuel Hughes. 413 pages; size, 4 1/4 by 7 inches. Illustrated with 31 engravings. Revised and enlarged edition. Bound in flexible cloth. Price, \$1.60.

This book opens with a brief allusion to some of the celebrated works of antiquity, and to the ancient modes of procuring water. Following this are chapters devoted to a mixed geological and hydrographical examination of the surface of England. The next part of the book relates to the sinking of wells and borings. The fourth part describes pumping machinery for raising water, and the principal varieties of engines and pumps used for this purpose in England and America. It also embraces numerous facts and calculations relating to the duty and power of pumping engines of various kinds. Next in order come several chapters relating to water works obtaining supplies from rivers, streams and drainage areas, and also a few chapters relating to filter beds and service reservoirs. This part of the book also contains some observations on the characteristics and flow of rivers, and on the cost and dimensions of embankments for reservoirs. The last section of the work is devoted to the flow of water in open channels and pipes, and to the subject of gauging the flow of water under various conditions, as in rivers, pipes and artificial open channels; also through orifices and over weirs.

Notes on Assaying and Assay Schemes. By P. de Peyster Ricketts. 210 pages; size, 6 1/4 by 9 1/2 inches; illustrated with 31 figures. Revised and enlarged edition. Bound in cloth. Price, 85 cents.

This volume is comprised in four general divisions, having the following titles, from which an idea of the scope and usefulness of the work may be gained.

Part I.—Apparatus, Reagents and Operations.
Part II.—Dry or Fire Assays.
Part III.—Wet Assays or Analyses.

An appendix is added containing information with reference to manipulation, blow-pipe analyses and reagents, special schemes, &c. The book embodies the system of assaying practiced in the School of Mines in Columbia College, New York. The system of assay weights employed will be found superior to any others in use in the saving

of time and calculation. The book will be found serviceable to the practical as well as the scientific student.

Steam Heating for Buildings, or Hints to Steam Fitters. By William J. Baldwin. 234 pages; size, 5 by 7 1/2 inches; illustrated, 66 figures. Bound in cloth. Price, \$2.50.

This is a very important work, in which a practical man tells what he knows in regard to setting up, fitting and designing steam-heating apparatus of all kinds, and gives enough of science to enable other practical men to do the same. The work opens with a description of the general principles involved in the simplest forms of steam-heating apparatus. The subject of radiators and radiating surfaces are discussed. In a chapter on boilers the author largely confines himself to those forms which have been most commonly employed in steam heating, describing their operation and illustrating the method of construction. The safety valve has a chapter devoted to it, and is graphically illustrated. The closing portion of the work includes the subject of steam and its properties, together with heating water and drying houses by steam. The book as a whole is one of the most practically valuable that has appeared for a long time. It should be in the hands of all boiler users and steam fitters.

Elementary Lessons on Applied Mechanics. By Robert Stowell Ball. 143 pages; size, 4 1/4 by 6 1/2 inches; illustrated with 66 figures. Bound in limp cloth. Price, \$1.00.

This little volume is intended for those who, having some knowledge of elementary mathematics, and mechanics, desire to gain information as to the practice of mechanical principles. An idea of the general scope of the work may be obtained from the titles of the three parts into which it is divided as follows:

Part I.—The Mechanical Powers.

Part II.—Tools.

Part III.—The Special Applications.

The subjects presented have been chosen so as to be, as far as possible, representative of the several departments, so that a person who masters this book will have a general notion of the field before him.

Lessons in Elementary Chemistry. By Henry E. Roscoe. 416 pages; size, 4 1/4 by 6 1/2 inches; illustrated with 73 engravings. Bound in cloth. Price, \$1.50.

This chemistry belongs to the same series as "Lessons in Elementary Physics," and is very similar in its general character to that work. It is an attempt to give in a concise manner, an outline of modern chemistry freed from the unscientific terms that have so long disfigured our older works on this subject. The theoretical portion of this little volume is exceedingly complete, and the student will not be at a loss to find formulae for almost any substance or compound that may be mentioned. Both mineral and organic chemistry are taken up, together with a short account of spectrum analysis, solar and stellar chemistry. The metric system of weights and measures and the centigrade thermometer scale are used throughout the work.

Lessons in Elementary Physics. By Balfour Stewart. 372 pages; size, 4 1/4 by 6 1/2 inches; illustrated with 138 figures. Bound in cloth. Price, \$1.50.

This is what would, in the past generation, have been called a natural philosophy. It covers, however, somewhat wider ground than works of that kind. It devotes as much space to the laws of motion, the forces of nature, heat, radiant energy and electricity as to that part which would be more correctly called natural philosophy. The metric system is used throughout the work. Beyond the laws of motion little or no attention is paid to mechanical physics. It is a useful reference book.

A Manual of Machinery and Millwork.

By William J. M. Rankine. 591 pages; size, 5 by 7 1/2 inches; illustrated with 287 engravings. Bound in cloth. Price, \$5.

This work is a classic, as well as a standard, and is almost too well known to need particular mention. It is divided into three general divisions, as follows:

Part I.—Geometry of Machinery.

Part II.—Dynamics of Machinery.

Part III.—Materials, Construction and Strength of Machinery.

For the mechanical engineer and student who wishes to study machinery and millwork, it is almost indispensable. While containing a vast amount of general information, it is highly mathematical in its character, and on that account is considered by some to have less value for the beginner. There is at the present time probably no work capable of taking its place or making even an approach to cover its field.

Remittances may be made by banker's draft on New York, Post Office order or registered letter, at our risk. Currency or stamps inclosed in common letters must be at risk of sender. Address,

DAVID WILLIAMS, 83 Reade St., New York.

RICHARDSON'S CELEBRATED SAWS



Richardson's Trade Mark. A Maltese Cross With the Letters E B R S T. Emblematical of the Standing of the Saws in the Trade.

RICHARDSON'S SAWS

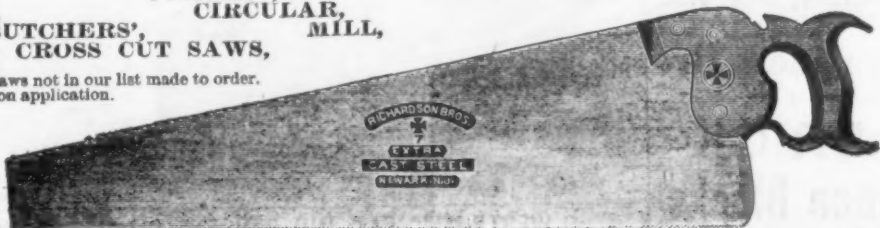
Have Justly Obtained an Envyable Reputation.
WE MAKE A FULL LINE OF

HAND, PANEL, BACK, COMPASS, CIRCULAR, BUTCHERS', AND CROSS CUT SAWS, MILL,

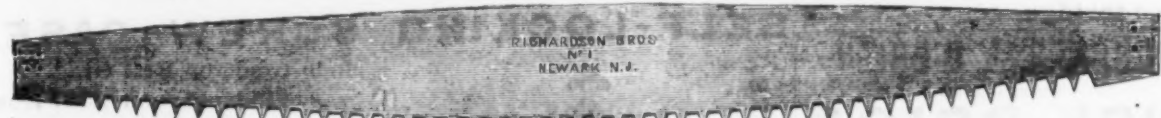
Special Saws or any Saws not in our list made to order. Illustrated catalogue on application.



Richardson's Excelsior Spring Braced Frame Wood Saw.—The Strongest and Stiffest Saw Frame in the Market.

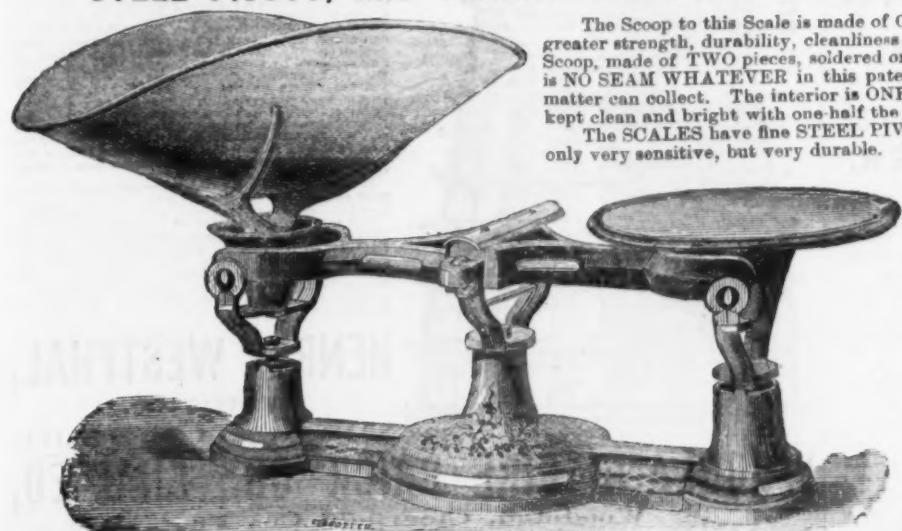


RICHARDSON'S HAND SAWS ARE UNEQUALLED FOR TEMPER AND WORKMANSHIP; TAPER GROUND, THIN AT BACK, PERFECTLY TRUE.



RICHARDSON'S PATENT TEMPERED AND PATENT GROUND SAWS.
RICHARDSON SAW WORKS, 15 to 27 River St., Newark, N. J., U. S. A.

COUNTER SCALES, STEEL PIVOTS, AND PATENT SEAMLESS SCOOP.



The Scoop to this Scale is made of ONE PIECE of metal, thus giving greater strength, durability, cleanliness and elegance, than the old style of Scoop, made of TWO pieces, soldered or otherwise joined together. There is NO SEAM WHATSOEVER in this patent Scoop in which dirt and other matter can collect. The interior is ONE SMOOTH SURFACE, and can be kept clean and bright with one-half the labor usually required. The SCALES have fine STEEL PIVOTS, highly tempered, and are not only very sensitive, but very durable. WEIGHTS INCLUDED.

LIBERAL DISCOUNT TO THE TRADE.

Send for Illustrated Price List, containing line of Platform—Counter Scales—Butter Scales, etc., etc.

No Charge for Delivery of Goods to Steamer or Cars in New York City.

SAMPLE ORDERS RESPECTFULLY SOLICITED.

ADDRESS,
Newark Hardware Works,
FACTORY, 60, 62 & 64 New Jersey R. R. Ave.,
NEWARK, N. J.

STODDARD LOCK CO.,

S. P. STODDARD, President.

104 READE STREET, NEW YORK.

JOSEPH H. SEED, Sec'y & Treas.

MANUFACTURERS OF PATENT

Cylinder and Recess TUMBLER LOCKS

FOR

Drawers, Desks, Chests, Boxes,

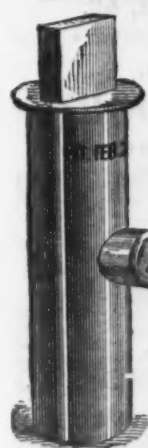
Right and Left

Hand Cupboards,

WINDOW SASHES,

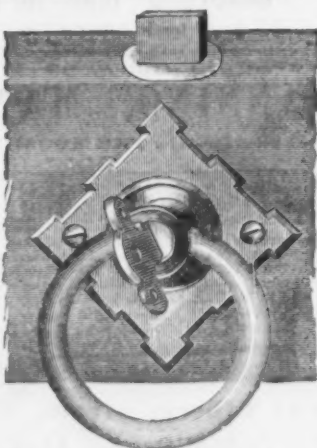
AND

General Cabinet and Builders' Work.



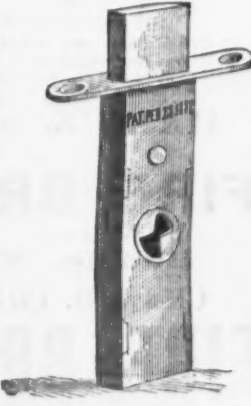
No. 25 Cylinder Lock, Showing Full Size of 1 inch to Keyhole.

Two Nickel-Plated Steel Keys with Each Lock.



Section Showing Appearance of Keyhole Drawer-Pull as Applied with Key in Lock.

Particular attention is directed to this latest and most novel feature in the lock business, which we believe will be very acceptable to the trade. Our Locks are made wholly of brass, and of superior finish. They are more secure and much neater than any lock in the market, as well as cheaper of application. No screws or nails are required to fasten our Cylinder Locks. We call special attention to our Patent Keyhole Drawer-Pull, which is applicable to any lock we make. Our goods are sold by all Jobbers in the United States. Catalogue and Price List sent on application.



No. 15 Recess Lock, Showing Full Size of 1 inch to Keyhole.

THE "EAGLE" ANVIL.

WARRANTED!!

Better than the Best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL. PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." It does not bounce the hammer back, and therefore can do more work with lighter hammer. Horn of tough untempered steel, never to break or bend. Only Anvil made in United States fully warranted as above. None genuine without our trade-mark.

N. B.—That the "Eagle" Anvil is the only one made at Trenton, New Jersey, and it must not be mistaken for an Anvil in the market called Trenton, but which is really of foreign manufacture, and an imported imitation of the English Anvil.



LATEST PATENT
APRIL 24, 1877.
ESTABLISHED
1843.
SOLD BY
New York—RUSSELL & ERWIN MANUFACTURING COMPANY, DUNN & McCARTY, TENNIS & WILSON.
Philadelphia—JAMES C. HAND & CO.
Boston—GEORGE H. GRAY & DANFORTH.
Baltimore—W. H. COLE & SONS, JOHN E. KELSO, JR.
Louisville—W. B. BELKNAP & CO.
Cincinnati—POST & CO.
Cleveland—THE LAKE ERIE IRON CO.

THE EAGLE LOCK CO.,

TERRYVILLE, CONN.,
MADE



(No. 4005.)

THE ONLY PIN-TUMBLER PAD LOCK EVER PRODUCED.

It is self-locking and perfectly secure. It is made of brass and finished by our patented process. We now make three sizes: No. 4005, 1 1/4 in.; No. 4006, 1 1/2 in.; and No. 4007, 1 3/4 in. The "changes" that can be made in these locks are so numerous that no two locks will ever be made alike, unless they are so ordered.

For Sale by Hardware Jobbers Throughout the Country.

THE WHIPPLE MFG. COMPANY,

CLEVELAND, OHIO,

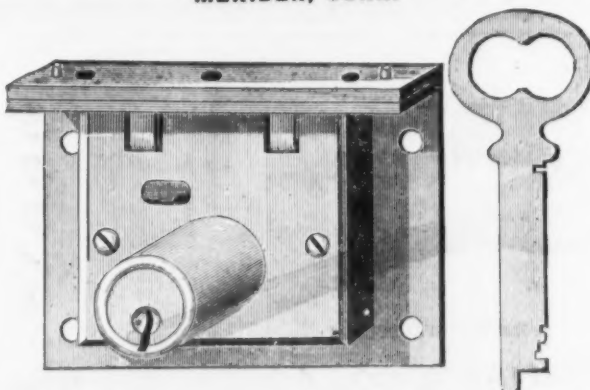
FINE BRONZE DOOR LOCKS, KNOBS AND TRIMMINGS.



REAL BRONZE BUTTS, STORE DOOR HANDLES with ORNAMENTAL BRONZE FRONT LOCK AND LATCH, And a general line of BUILDERS' HARDWARE.

THE CHARLES PARKER CO.,

MERIDEN, CONN.



MANUFACTURERS OF CABINET LOCKS, D. SAUNDERS' SONS,

MANUFACTURERS OF THE ORIGINAL

I. X. L.

Pipe Cutting and Threading Machine,

BEWARE OF IMITATIONS.

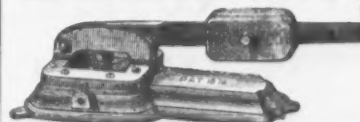
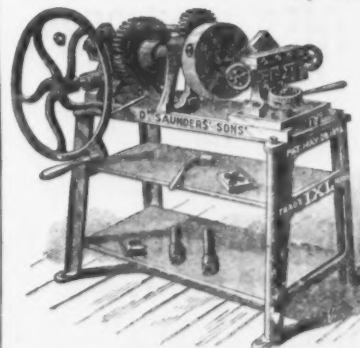
None Genuine without our Trade Mark and Name.

Steam and Gas Fitters' Hand Tools.

Pipe Cutting and Threading Machines for Pipe Mill use a Specialty.

YONKERS, N. Y.

Send for Circulars.



Automatic Damper Regulators and Weighted Gage Cocks.

In extensive and successful use by the best concerns in the country. They have no equals. Liberal discounts to the trade. Send for Circulars and Price Lists.

MURRILL & KEIZER, 28, 30, 32 Holliday Street, Baltimore.

J. E. QUACKENBUSH & SON,

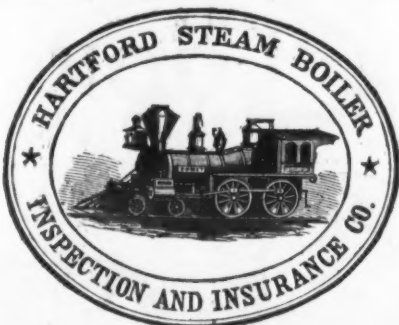
MANUFACTURERS OF

Porcelain, Mineral & Jet Knobs & Escutcheons.

Send for Price List and Terms

OFFICE,
535 5th Ave., N. Y.





Issues Policies of Insurance after a careful inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery,
ARISING FROM
STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of Steam Boilers.

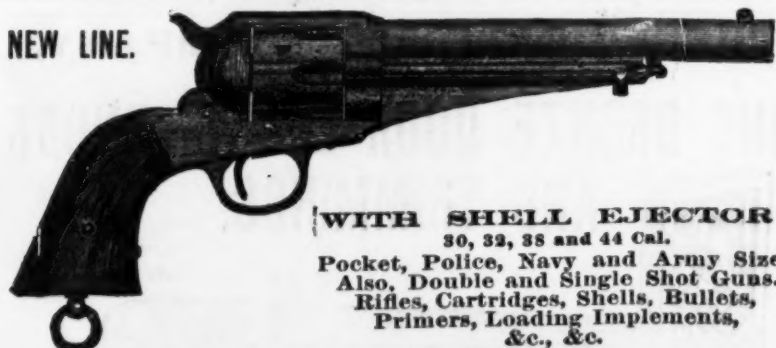
Full information concerning the plan of the Company's operations can be obtained at the
COMPANY'S OFFICE, HARTFORD, CONN.,
or at any agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. Pierce, Sec.

Board of Directors.

J. M. ALLEN, President.
LUCIUS J. HENDERSON, President Aetna Fire Ins. Co.
FRANK W. CHENEY, of Cheney Bros. Silk Mfrs.,
Hartford and New York.
CHARLES M. BEACH, of Beach & Company.
DANIEL PHILLIPS, of Adams' Express Company.
GEO. M. BARTHOLOMEW, President Holyoke Water
Power Company.
RICHARD W. H. JARVIS, President Colt's Pat. Fire
Arms Manufacturing Co.
THOMAS O. ENDERS, of the Aetna Life Insurance Co.
LEVERETT BRINARD, of the Case, Lockwood &
Brainerd Co.
GEN. WM. B. FRANKLIN, Vice-President Colt's Pat.
Fire Arms Mfg. Co.
GEO. CROMPTON, Crompton Loom Works, Worcester,
Mass.
HON. THOMAS TALBOT, Ex-Governor of Massachusetts,
Lowell.
NEWTON CASE, of the Case, Lockwood & Brainerd Co.
WM. A. SLATER, Cotton Manufacturer, Providence.
NELSON HOLLISTER, of the State Bank, Hartford.
CHAS. T. PARKY, of Baldwin Locomotive Works,
Philadelphia.
HON. HENRY C. ROBINSON, Attorney at Law, Hartford.

NEW LINE.



Send for reduced catalogue and discounts of goods manufactured by

E. REMINGTON & SONS,
233 Broadway, NEW YORK.

PHILADELPHIA SMELTING COMPANY, Limited

S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.

GENUINE BABBITT, Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.
Office JAMES BUTTERWORTH & SON, Manufacturers of Woolen Machinery, 252, 254, and 256 E. Adams St. PHILADELPHIA, October 17, 1891.
PHILADELPHIA SMELTING COMPANY.—GENTLEMEN: We have been running your "Genuine Babbitt" on our wood drilling machine for the last eight years at a speed of 900 revolutions per minute, without renewal. We have found it to be the best metal we ever used.
Yours truly, JAMES BUTTERWORTH & SON.

DEOXIDIZED BRONZE,
Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.

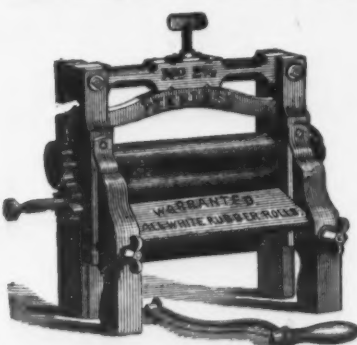
PHILADELPHIA, October 4, 1892.
PHILADELPHIA SMELTING COMPANY, City.—GENTLEMEN: After a trial of eighteen months of your "Deoxidized Bronze" as journal boxes in our rolling mill, where great pressure is required, we take pleasure in recommending it as being superior to any we have heretofore used.
Very truly, HENRY DISSTON & SONS.



Send for Circular.

SOLE MANUFACTURERS:

H. PRENTISS & CO., 42 Dey St., New York.



"PEERLESS"
CLOTHES WRINGERS.

Sold by the Jobbing Trade

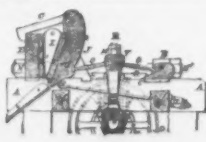
Everywhere.

THE SIMPSON AND GAULT MFG. CO., Cincinnati, O.
L. F. BLUE, General Agent.

ALL MAKES OF
BARBED FENCE WIRE,
Stretchers, Diggers, Staples, &c. And
LOWE'S METALLIC PAINT,
The Great Railroad Paint.

CHARLES E. McBRIDE, Eastern Agent, 197 Pearl Street, New York.
Also, Boston, Philadelphia and Baltimore.

BLAKE
CRUSHER CO.,
New Haven Conn.



BLAKE'S
Challenge Rock Breakers.
Patented Nov. 18, 1879.
See The Iron Age first issue of the month.

B. KREISCHER & SONS,
FIRE BRICK.

BEST AND CHEAPEST.

Established 1845.

Office, foot of Houston Street, East River,
NEW YORK.

NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK
Stove Linings,
Range and Heater Linings

Cylinder Brick, &c., &c.

English, Scotch and Welsh

FIRE BRICKS,
Dinas and Silica Bricks
for Glass and Steel Works.
S. A. RIMINGTON,
40 and 42 Broadway, New York.
Yard foot of 4th St., Hoboken, N. J.

M. D. Valentine & Bro

Manufacturers of

FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.
Woodbridge, - - - N. J.

BORGNER & O'BRIEN,

Manufacturers

FIRE BRICK
AND
Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.

WATSON FIRE BRICK CO.,

ESTABLISHED 1846.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey

FIRE BRICK,
FOR ROLLING MILLS, BLAST FURNACES, FOUNDRY
DRYER GAS WORKS, LIME KILNS, TANNERIES,
BOILER AND GRATE SETTING, GLASS WORKS, &c.
Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,
Proprietor of the
Excelsior Fire Brick & Clay
Retort Works,
Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.

WORKS: PERTH AMBOY, NEW JERSEY
Office & Depot 418 to 422 East 23d St., N. Y.

TROY FIRE BRICK WORKS,

Troy, N. Y.,
JAMES OSTRANDER & SON,

ESTABLISHED 1848,
Manufacturers of

FIRE BRICK,
For Boilers, Tiles, Blast Furnace Blocks, &c. Miners and
Jewellers in Woodbridge Fire Clay and Sand, and Staten
and Kaolin.

Established 1864.

GARDNER BROTHERS,

Manufacturers of

STANDARD SAVAGE FIRE BRICK,
TILE & FURNACE BLOCKS,
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and
Miners and Shippers of Fire Clay.
OFFICE: 116 Smithfield St., Pittsburgh, Pa.
WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,

FIRE BRICK,

Buffalo, N. Y.

CHAS. D. COLSON,
FIRE BRICK,

Foundry Facings Sand, Tools and Supplies.
CHICAGO, ILL.

Please mention this paper.

UNION MINING COMPANY.
Mount Savage Fire Brick.
EDWARD J. ETTING Agent,
230 South Third St., Philadelphia, Pa.

MILLER'S BRICK PRESSES

Established 1844.

FIRE AND RED BRICK.
And Brickmakers' Tools in General.

SAML. P. MILLER & SON,
309 South 5th St., Philadelphia.

A. HALL TERRA COTTA CO.,

Manufacturers of

FIRE BRICK, FURNACE BLOCKS, &c.
ARCHITECTURAL TERRA COTTA.
Moulded, Buff and Colored Building Brick.
Perth Amboy, N. J.

American Bolt and Screw Case Co.,

Successors to W. R. Baker & Co.

DAYTON, OHIO.

Send for Illustrated Price List.



We take pleasure in informing the trade that we are sole owners of the Patents and Manufacturers of the latest and most improved Bolt and Screw Cases. Dealers have long since felt the need of a Bolt and Screw Case that would answer the purpose for which it was intended. We feel confident that we are able to supply this want in our Revolving Cases. Iron cases with a dozen or more revolving shelves have been patented and put upon the market as long ago as 1871, but owing to their intricate construction, as well as their constant liability of getting out of order, necessitated the invention of a more practical case. Our Patents are of a recent date and the cases are strictly draw cases, provided with stops to prevent their removal from case. The numbers of Bolts and Screws are handsomely printed on the fronts of the drawers and present a highly ornamental appearance to the counter. These cases are so simple in their arrangement that no effort is required to find any number, as the entire case revolves, and the selection can be made instantly, while in revolving shelf cases only one shelf can be operated at the same time, and when once disturbed must first be put in proper position before any compartment can be got at in the shelf below; besides the numbers are mainly on the side of the case opposite to the person operating the same, which makes it difficult to know which shelf contains the number you wish to get at. Besides in shelf cases the screws often interfere with the revolving of the shelves, while the case must be taken apart or the glass removed to relieve the shelf. For further particulars we refer you to the following first-class houses that handle our cases exclusively:

PRINCIPAL AGENTS.

LLOYD, SUPPLEE & WALTON, Phila.
A. F. SHEPHERD & CANTWELL, HARDWARE CO., St. Louis.
BINDLEY HARDWARE CO., Pittsburgh.
SAMUEL G. B. COOK & CO., Baltimore.
J. C. DESSAINT & SONS, Dayton, O.
H. O. STRATTON, Boston.
DUCHEMIN, PLANCHER & CO., Detroit.
HUNTINGTON, HOPKINS & CO., San Francisco.
HILBARD, SPENCER, BARTLETT & CO., Chicago.
MARKLEY, ALLING & CO., Chicago.
HOWELL, GAY & CO., Cincinnati.
PRATT & CO., Buffalo.
MARK & CO., London and Hamburg.
HALL & WILLIS, HDW. CO., Kansas City.
WETH H. W. & MFG. CO., St. Joseph.
SEEBERGER, BREAKER & CO., Chicago.

WESTPHAL'S PAT. INDEPENDENT REVOLVING SHELVES

—AND—

SELF-LOCKING SCREW CASE.

Made from the Best Gray,
Malleable and Sheet Iron.

This is not a Drawer Case. This Structure has been purposely invented on account of trouble caused by a Drawer.

The Standard of This Case is a Hollow Cone,
Firm as a Rock, on Which all
Shelves Revolve.

All Shelves can be taken off and replaced in a few minutes.
The ornamental front frames of each Circle, well protected, contain a piece of glass, whereby the dealer can see through all Compartments in a minute, and if any number is out, can fill, or if not in stock, can order, which is a Drawer-Case makes a great deal of trouble. The front frames can be taken out and replaced by anyone in no time, thus making it the most perfect structure ever placed upon the market. With beauty and strength combined, it surpasses even perfection in the highest state.
You have no drawers to take out or put back. No mixing of screws by Customers helping themselves, as in the case with drawers taken from the shelves; or still worse, when standing on the counter. No losing of Customers while looking through drawers of mixed screws.
In our case only one compartment is open at the time and the balance all closed. No one can get into the case except the men behind the counter. Any number can be found instantaneously. By turning to the right, numbers increase, by turning to the left, decrease. All numbers are cast on the frames and gold-bronzed. We guarantee our case for 5 years, and if not found superior to any case now offered to the trade, after trial, can be returned at our expense, and will refund the money.

HENRY WESTPHAL,
MANUFACTURER,

86 Market St., CHICAGO, ILL.

WOODLAND FIRE BRICK CO., LIMITED,

Woodland, Clearfield Co., Pa.,

MANUFACTURERS OF
"WOODLAND" BRAND FOR STEEL FURNACES OF ALL KINDS, BLAST FURNACES AND MALLEABLE IRON WORKS.

"BRADFORD" Brand for Rolling Mills, Glass Houses, &c.

"W. F. B." Brand for Hot Blast Stoves, Stocks, Cupolas, and all work requiring a close and very hard brick. Also, Fine Ground Clay to lay brick.

Western Office, 49 Wood Street, Pittsburgh, Pa.

MANNING, MAXWELL & MOORE,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



111 Liberty Street, NEW YORK.

BROWN'S ADJUSTABLE PIPE TONGS.

Made from
best selected
Iron.

The Ashcroft Mfg. Co.,
111 LIBERTY STREET, NEW YORK.

HEMACITE

WILCOX & HOWE, Birmingham, Ct.,
Carriage Hardware.

See The Iron Age first issue of each month.

The Iron Age Directory

and Index to Advertisements.

The Iron Age Directory		and Index to Advertisements.	
Agricultural Implements.		Alfred & Co., 93 Chambers, N. Y.	
Air Compressors.		Alfred & Co., 93 Chambers, N. Y.	
Air Pumps.		Alfred & Co., 93 Chambers, N. Y.	
Alarm Money Drivers.		Alfred & Co., 93 Chambers, N. Y.	
Anti-Friction Metals.		Alfred & Co., 93 Chambers, N. Y.	
Avalanche.		Alfred & Co., 93 Chambers, N. Y.	
Arms and Ammunition.		Alfred & Co., 93 Chambers, N. Y.	
Barb Wire.		Alfred & Co., 93 Chambers, N. Y.	
Barrel Machinery.		Alfred & Co., 93 Chambers, N. Y.	
Bellevue, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Belts, Farm.		Alfred & Co., 93 Chambers, N. Y.	
Belts (Machinery).		Alfred & Co., 93 Chambers, N. Y.	
Belts (Fasteners).		Alfred & Co., 93 Chambers, N. Y.	
Belt Hooks.		Alfred & Co., 93 Chambers, N. Y.	
Belting, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Bicycles.		Alfred & Co., 93 Chambers, N. Y.	
Bird Cages, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Bits and Graces, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Blocks, Tackle, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Boilers, Steam.		Alfred & Co., 93 Chambers, N. Y.	
Boiler Cutters.		Alfred & Co., 93 Chambers, N. Y.	
Boils.		Alfred & Co., 93 Chambers, N. Y.	
Boys.		Alfred & Co., 93 Chambers, N. Y.	
Brass, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Brass Foundry.		Alfred & Co., 93 Chambers, N. Y.	
Brass Wire Cloth.		Alfred & Co., 93 Chambers, N. Y.	
Bridge Builders.		Alfred & Co., 93 Chambers, N. Y.	
Buckets, Pump and Elevator.		Alfred & Co., 93 Chambers, N. Y.	
Builders' Hardware.		Alfred & Co., 93 Chambers, N. Y.	
Butcher and Sheep Knives, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Butte and Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Carriage Bolts, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Carriage Hardware, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Car Axles.		Alfred & Co., 93 Chambers, N. Y.	
Castings.		Alfred & Co., 93 Chambers, N. Y.	
Castings, Iron.		Alfred & Co., 93 Chambers, N. Y.	
Castings, Steel.		Alfred & Co., 93 Chambers, N. Y.	
Chain Belting.		Alfred & Co., 93 Chambers, N. Y.	
Chains, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Chemicals.		Alfred & Co., 93 Chambers, N. Y.	
Chisels, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Clock Springs.		Alfred & Co., 93 Chambers, N. Y.	
Coach Screws.		Alfred & Co., 93 Chambers, N. Y.	
Coal, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Coal and Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Office and Ship Mill.		Alfred & Co., 93 Chambers, N. Y.	
Coke.		Alfred & Co., 93 Chambers, N. Y.	
Compass and Callipers, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Copper.		Alfred & Co., 93 Chambers, N. Y.	
Cordage.		Alfred & Co., 93 Chambers, N. Y.	
Corked Iron.		Alfred & Co., 93 Chambers, N. Y.	
Coverings, Boiler and Pipe.		Alfred & Co., 93 Chambers, N. Y.	
Crucibles.		Alfred & Co., 93 Chambers, N. Y.	
Crucibles.		Alfred & Co., 93 Chambers, N. Y.	
Cutlery.		Alfred & Co., 93 Chambers, N. Y.	
Cutlery, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Deoxidized Bronze.		Alfred & Co., 93 Chambers, N. Y.	
Differential Pulley Blocks.		Alfred & Co., 93 Chambers, N. Y.	
Dye Collars.		Alfred & Co., 93 Chambers, N. Y.	
Discount Banks and Tables.		Alfred & Co., 93 Chambers, N. Y.	
Door and Gate Springs.		Alfred & Co., 93 Chambers, N. Y.	
Door Hangers.		Alfred & Co., 93 Chambers, N. Y.	
Drilling Machines, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Dry Hammers.		Alfred & Co., 93 Chambers, N. Y.	
Edge Tools, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Elevators, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Emery and Emery Wheels.		Alfred & Co., 93 Chambers, N. Y.	
Engineers' Supplies.		Alfred & Co., 93 Chambers, N. Y.	
Explosives, Gun.		Alfred & Co., 93 Chambers, N. Y.	
Explosives, Locomotive.		Alfred & Co., 93 Chambers, N. Y.	
Explosives, Steam.		Alfred & Co., 93 Chambers, N. Y.	
Files, Importers of.		Alfred & Co., 93 Chambers, N. Y.	
Files, Manufacturers of.		Alfred & Co., 93 Chambers, N. Y.	
Fire Bricks, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Fire Shovels and Pokers.		Alfred & Co., 93 Chambers, N. Y.	
Fitters.		Alfred & Co., 93 Chambers, N. Y.	
Fishing Tackle.		Alfred & Co., 93 Chambers, N. Y.	
Forges, Portable, &c.		Alfred & Co., 93 Chambers, N. Y.	
Forgings, Iron and Steel.		Alfred & Co., 93 Chambers, N. Y.	
Foundry Supplies.		Alfred & Co., 93 Chambers, N. Y.	
Furnaces, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Furnace Charging Scale.		Alfred & Co., 93 Chambers, N. Y.	
Furnace for Setting Steam Boilers.		Alfred & Co., 93 Chambers, N. Y.	
Furnace Holders.		Alfred & Co., 93 Chambers, N. Y.	
Furnace Shields.		Alfred & Co., 93 Chambers, N. Y.	
Furniture Springs.		Alfred & Co., 93 Chambers, N. Y.	
Gauge Cocks.		Alfred & Co., 93 Chambers, N. Y.	
Granite Iron Ware.		Alfred & Co., 93 Chambers, N. Y.	
Grates, Bars.		Alfred & Co., 93 Chambers, N. Y.	
Grindstones.		Alfred & Co., 93 Chambers, N. Y.	
Guns, Makers of.		Alfred & Co., 93 Chambers, N. Y.	
Handles (Hickory).		Alfred & Co., 93 Chambers, N. Y.	
Handles, Spokes, &c.		Alfred & Co., 93 Chambers, N. Y.	
Hangers, Bar Door.		Alfred & Co., 93 Chambers, N. Y.	
Hardware Commission Merchants.		Alfred & Co., 93 Chambers, N. Y.	
Hardware Dealers.		Alfred & Co., 93 Chambers, N. Y.	
Hardware (Fancy).		Alfred & Co., 93 Chambers, N. Y.	
Hardware Importers.		Alfred & Co., 93 Chambers, N. Y.	
Hardware Manufacturers.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred & Co., 93 Chambers, N. Y.	
Hinges.		Alfred &	

NEW YORK WHOLESALE PRICES, August 23, 1882.

METALS.

IRON.—Perry, Bars, 1 to 1 1/2 in. Sheet, Band No. 20 and 22, 14 to 16 in. provided, that none of the above iron shall pay a less rate of duty than 25 per cent. 112.5¢ per ton; Polished Sheet, 30 in. 115.0¢ per ton; Cast Scrap, 85¢ per ton. Rail-roads, 100, 100, 100. Boiler and Plate, 115¢ per ton.

American Iron. Foundry, No. 12. 110.00 per ton. Foundry, No. 22. 110.00 per ton. Gray Iron. 110.00 per ton.

Scotch Iron. Foundry, No. 12. 110.00 per ton. Foundry, No. 22. 110.00 per ton. Gray Iron. 110.00 per ton.

English Iron. Foundry, No. 12. 110.00 per ton. Foundry, No. 22. 110.00 per ton. Gray Iron. 110.00 per ton.

Rails. Iron, 110.00 per ton. Steel, 110.00 per ton. Old Rails, 110.00 per ton. Old Rails, 110.00 per ton.

Scrap. Wrought Scrap, 110.00 per ton. Cast Scrap, 110.00 per ton. Steel Scrap, 110.00 per ton.

Steel. Common Iron, 110.00 per ton. R. G. American, 110.00 per ton. R. G. American, 110.00 per ton.

Galvanized. 110.00 per ton. Galvanized, 110.00 per ton. Galvanized, 110.00 per ton.

Copper. 110.00 per ton. Copper, 110.00 per ton. Copper, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

Zinc. 110.00 per ton. Zinc, 110.00 per ton. Zinc, 110.00 per ton.

Aluminum. 110.00 per ton. Aluminum, 110.00 per ton. Aluminum, 110.00 per ton.

Steel. 110.00 per ton. Steel, 110.00 per ton. Steel, 110.00 per ton.

Iron. 110.00 per ton. Iron, 110.00 per ton. Iron, 110.00 per ton.

Brass. 110.00 per ton. Brass, 110.00 per ton. Brass, 110.00 per ton.

Lead. 110.00 per ton. Lead, 110.00 per ton. Lead, 110.00 per ton.

HERMANN BOKER & CO.,

101 and 103 Duane Street, New York.

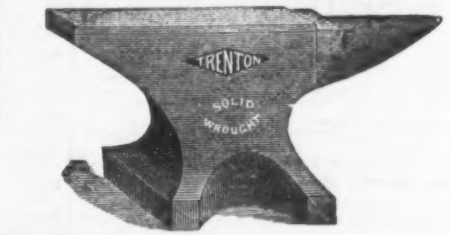
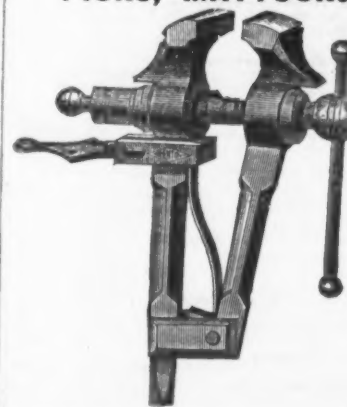
PROPRIETORS OF TRENTON VISE & TOOL WORKS.

PICKS, MATTOCKS, CRUB HOES, HAMMERS.

WROUGHT IRON STEEL FACE

(P. W. PATTERN.)

"FULLY WARRANTED."



Sole Agents for

H. Boker & Co.'s Celebrated "Tree" Brand Cutlery.

K. Heinisch's Sons Unrivaled Shears, Trimmers, Scissors, Japanned and Nicked.

Ward & Payne's Sheep Shears.

Gardner's 1881 Razors.

J. W. Gardner's Unequaled

and "Warranted Superior to

All" Barlows, Pocket and

Table Cutlery.

Geo. Wostenholm & Son's,

Wade & Butcher's, Trenton,

and O. K. Pocket Cutlery

and Razors.

Jno. Wilson's Butcher Knives,

Steels and Shoe Knives,

New England Cutlery Co.'s

Table Cutlery,

W. Butcher's Files and Tools.

Guns and Pistols,

Arms and Ammunition.

OLD COLONY IRON CO.,

TAUNTON, MASS., Manufacture

NAILS, SHOVELS, SPADES, SCOOPS, &c., &c.

Warehouse: 211 Pearl St., New York. P. O. Box 1267. A. L. REID, Agent.

RUBBER & LEATHER

BELTING,

HOSE, PACKING,

Lace Leather, Wringer Rolls,

Grain Drill Tubes, &c.

Rubber goods of all kinds at manu-

facturers' prices. Send for Price List.

R. T. WHELPLEY,

Gen'l Agent,

HAMILTON RUBBER CO.,

131 and 133 Lake St., Chicago, Ill.

THE BEST AND CHEAPEST FASTENING FOR

WIRE FENCES.

The "Plymouth" Fence Wire Nail.

Patented April 18, 1882.

MANUFACTURED BY

THE PLYMOUTH MILLS,

PLYMOUTH, MASS.

Easy to drive, hold firmly, and more in number

to the pound than any staple made.

CHICAGO AGENTS:

HIBBARD, SPENCER, BARTLETT & CO.,

LAKE AND WABASH.

INTERCHANGEABLE

LOCK-CORNER SHELF BOXES,

Screw Cases, &c.,

FOR THE HARDWARE TRADE.

S. H. GREEN

125 Murray St., New York.

ESTABLISHED 1835

HARDWARE & TOOL CO.

BEMIS & CO.

ALL GOODS STAMPED WITH BEMIS & CO.

AND OTHERS GENUINE

TELESCOPE TUBES.

Fine Mandrel drawn Tubes, from Brass or German

Silver. Tubes for sliding one within the other

made to order. Manufactured by ROBT. T. DEAN

KIN & CO., 100 N. 12th St., Philadelphia, makers

of the American Improved Brass Garden Syringe.

GEO. M. EDDY & CO.,

Manufacturers of

Measuring Tapes

Of Cotton, Linen & Steel.

ALL PURPOSES.

to 353 Clason Ave., Brooklyn, N. Y.

Butchers' Cleavers,

Axes and Hatchets,

Grub Hoes and Mattocks,

Mill Picks,

Box Chisels and Scrapers,

Ring Bush Hooks,

Ax Eye Bush Hooks,

Socket Bush Hooks,

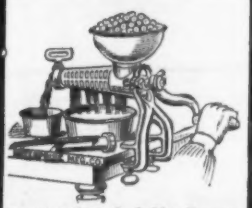
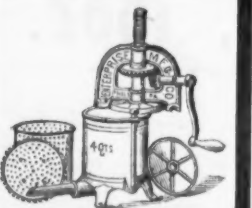

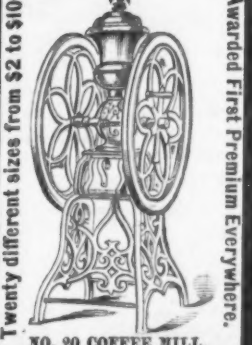



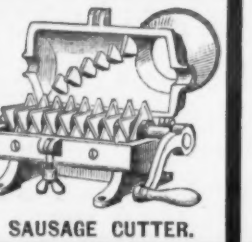
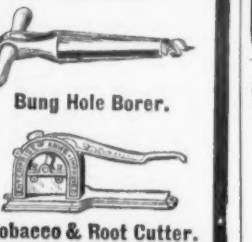
Watt's Ship Carpenters' Tools,

Carpenters' Drawing Knives,

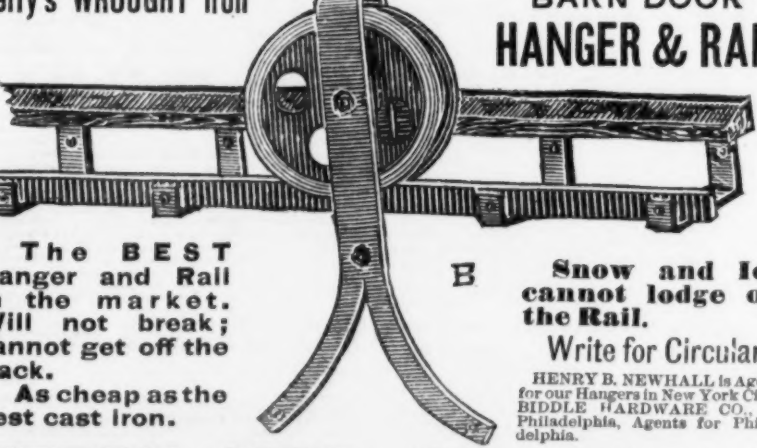
Coopers' and Turpentine Tools.

FOR SALE BY

MARTIN DOSCHER, Agent, 85 Chambers Street, N. Y.

 Fruit, Wine & Jelly Press.	 SAUSAGE STUFFER.	 MOLASSES. Self-Measuring Faucet.
<p>ENTERPRISE MANUFACTURING CO. OF PA., THIRD & DAUPHIN STS., PHILADELPHIA, PA.</p>		
 Twenty different sizes from \$2 to \$100 Awarded First Premium Everywhere. NO. 20 COFFEE MILL.	 Tincture Presses, Self-Weighting Cheese Knife, Cork Presses. THE BEST ARE THE CHEAPEST. MRS. POTTS' Cold Handle Double Pointed Sad Irons. SOLD BY HARDWARE DEALERS. SEND FOR ILLUSTRATED CATALOGUE, FREE.	 Smoked Beef Shaver.
 SAUSAGE CUTTER.	 Tobacco & Root Cutter.	 Bung Hole Borer.

Terry's WROUGHT Iron



BARN DOOR HANGER & RAIL

The BEST Hanger and Rail in the market. Will not break; cannot get off the track.
As cheap as the best cast iron.

Snow and Ice cannot lodge on the Rail.
Write for Circulars.
HENRY B. NEWHALL is Agent for our Hangers in New York City
BIDDLE HARDWARE CO. of Philadelphia, Agents for Philadelphia.

TERRY MFG. CO., Dundee, N. Y.

PRENTISS' PAT. VISES,
Adjustable Jaw.
Stationary or Pat. Swivel Bottoms.
ADAPTED TO ALL KINDS OF VISE WORK. ALSO
"PEERLESS" SWIVEL PIPE GRIP,
FITS ANY VISE. SOLD BY THE TRADE.
PRENTISS VISE CO.,
23 Day Street, New York.
SOLE PROPRIETORS. SEND FOR CIRCULAR

THE CLARK MFG CO. MANUFACTURERS OF BUILDERS' HARDWARE BUFFALO, N.Y.


THE STANLEY WORKS,
MANUFACTURERS OF
Wrought Iron Butts, Hinges
AND
DOOR BOLTS,
Plain, Japanned, Bronzed and Plated.
FACTORIES: NEW BRITAIN, CONNECTICUT. WAREHOUSE: 79 CHAMBERS ST., NEW YORK.

RHODE ISLAND HORSE SHOE CO.,
MANUFACTURERS OF
Horse, Mule & Snow Shoes of the Perkins Pattern.
Works at Valley Falls, R. I. Office, 31 Exchange Place, Providence, R. I.
F. W. CARPENTER, President C. H. PERKINS, Gen'l Manager. R. W. COMSTOCK, Secretary


Bemis & Call Hardware & Tool Co.

PATENT COMBINATION WRENCH.
These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench thus making a combination which has no equal.
For Circulars and Price List, address
BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.

The "Eureka" Pipe Cutter




THE BODY—is fitted with an adjustable Cast-Steel Jaw at the point where it comes in contact with the Pipe, which Jaw can be renewed at any time by simply removing one screw. By this system the wearing away of the Jaw (which in other cutters is the first part to give out) is effectually prevented, and this tool can be kept in first-class order at all times.
THE WHEEL BLOCK.—This is also of Steel, neatly fitted to its socket and cannot be dropped out. It is much more durable than the cast-iron blocks and is hardened at the point where the rod comes in contact with it.
THE HANDLE—of this Cutter is put on to stay, and cannot be removed by the roughest usage, as it is an iron handle, cast fast to the Rod, operating the block.
—MANUFACTURED BY—
Pancoast & Maule 243 & 245 SOUTH THIRD STREET PHILADA.

GILLESPIE BROS. & CO.,
PITTSBURGH, PA.,
MANUFACTURERS OF THE FOLLOWING SPECIALTIES:

SOLID BOX VISES,
Com. Carriage Bolts,
SOLID STEEL AND STEEL-FACED SLEDGES,
BLACKSMITH TOOLS,
PLOW BOLTS,
GRASS ROD AND HEEL BOLTS,
AND
Oil and Artesian Well Supplies.
LOVEJOY & DRAKE,
EASTERN AGENTS,
49 Cortlandt Street, - NEW YORK.

S. OBERMAYER & CO.,
Manufacturers of and dealers in all kinds of
FOUNDRY FACINGS AND BLACKINGS, PLUMBAGO AND FOUNDRY SUPPLIES.
Capacity of Works, 650 Barrels per day.
HEAVY MACHINERY and FINE STOVE PLATE FACINGS A SPECIALTY.
Send for Catalogue and Price List.
Office and Works, - CINCINNATI, OHIO, U. S. A.

V. G. HUNDLEY,
PROPRIETOR OF
NORTH CAROLINA HANDLE CO.,

MANUFACTURER OF
Handles and Spokes,
79 Reade Street and 97 Chambers Street, NEW YORK
HARDWARE COMMISSION MERCHANT.

JARVIS PATENT FURNACE
For Setting Steam Boilers.

Economy of Fuel, with increased capacity of steam power.
The same principle as the SIEMENS PROCESS OF MAKING STEEL; utilizes the waste gases with hot air on top of the fire. Will burn all kinds of Waste Fuel without a blast, including screenings, wet peat, wet hops, sawdust, logwood chips, slack coal, &c.
Send for circular.
A. F. UPTON, General Agent
7 Oliver Street (P. O. Box 341), BOSTON, MASS.

CAPITAL CITY MALLEABLE IRON CO.,
BROADWAY & FOURTH AVE., ALBANY, N. Y.,
MALLEABLE & GREY IRON CASTINGS
For all Kinds of Agricultural Implements, Stoves, &c.

ALL MALLEABLES MADE FROM IMPROVED AIR FURNACES.

CHAMPION HOG RINGER
RINGS and HOLDER.
Only double ring ever invented. The only Ring that will effectually keep Hogs from rooting. No sharp points in the nose.
Rings 750. Rings, 100. Holders, 750. Huskers, 150.
CHAMPERS, BEHRING & QUINLAN, Exclusive Manufacturers, Decatur, Ill.

EAGLE MILL CORN HUSKER
is the best Husker in the market. Farmers say it is the best. Use no other.
BROWN'S HOG AND PIG RINGER and RINGS.
Only single Ring in the market that closes on the outside of the nose. No sharp points in the nose to keep it sore.
BUTLER & COLDEY MFG. CO., Limited,
MANUFACTURERS OF
Hardware and Machinist Tools,
Factory ARLINGTON, N. J., P. O. Box 1593. Office, 97 Chambers St., NEW YORK

PERFECTION WINDOW CLEANER.



To the Jobbing Trade

We wish to call the attention of jobbers in Hardware, Woodenware and Housefurnishing trades to the

ACKNOWLEDGED MERIT
OF OUR

Window Cleaners.

They will find them very saleable, with a demand that is constantly increasing. We should be pleased to have a trial order.

VERY LIBERAL DISCOUNTS.

CAUTION.—We own all the patents covering rubber devices for cleaning windows, and will promptly prosecute parties infringing.

The genuine have two rubbers, metallic strip, open hollow iron handle, with P. W. C. Co. cast in face; name, date of patents and copyrighted directions.

PERFECTION WINDOW CLEANER CO.,
232 La Salle St., CHICAGO, ILL.

BARNES'
Patent Foot and Steam Power Machinery. Complete outfits for Actual Work-shops. Business Lathes for Wood or Metal. Circular Saws, Scroll Saws, Formers, Mortisers, Tenoners, &c. &c. Machines on trial if desired. Descriptive Catalogue and Price List free.
W. F. & JOHN BARNES, Rockford, Ill.
No. 2046 Main St.

Grindstones, Emery, &c.
Walter R. Wood, GRINDSTONES.
Berea, O., Nova Scotia, & other brands
283 and 285 Front Street, New York.

GEO. CHASE,
The largest manufacturers in the world of
OIL STONE
Of all description.
107th Street and Harlem River.
Send for Illustrated Price List. NEW YORK

McDERMOTT & BEREA STONE CO.
ALL SIZES & GRADES
SEND FOR PRICES
GRINDSTONES
CLEVELAND, O.

OHIO GRINDSTONE COMPANY,
H. H. CLOUGH, Pres. J. M. WORTHINGTON, Secy
JAMES NICHOLL, V. Pl. E. K. MESSEY, Treas.
Manufacturers of

GRINDSTONES
Of All Kinds.
127 Superior Street, CLEVELAND, OHIO.
LOMBARD & CO.,
Imports and Dealers in all kinds of
GRINDSTONES,
Cor. Lewis Wharf & Atlantic Ave., Boston.
Stones for Machine's, Carpenters, Farmers and Glass Cutters constantly on hand and out to order.

New York Wholesale Prices, August 23, 1882.

HARDWARE.

[illegible]

Major Stocks. Emerson, \$10 60 @ 65 %
Bader's Emerson, \$10 60 @ 65 %
Bader's (no Emerson), \$10 60 @ 65 %
Bader's (no Emerson), \$10 60 @ 65 %
Hunt's, \$10 60 @ 65 %
Chapman, \$10 60 @ 65 %
Torrey's, \$10 60 @ 65 %

Rivets.
Round, annealed, new list, Dec. 10, 1881, \$10 60 @ 65 %
In bulk, new list, Dec. 10, 1881, \$10 60 @ 65 %
Copper Rivets and Burrs, \$10 60 @ 65 %
No. 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981

Saves its cost every time it is used, and is endorsed by the best engineers.

**ASBESTOS MATERIALS, FIBRE, MILLBOARD
PACKING AND CEMENT.**

Address **CHALMERS SPENCE CO.**
GERMANIA BANK BUILDING, 23 John St., N. Y.
Pittsburgh, Pa.

PHILADELPHIA.

R. H. WOLFF & CO., Steel Wire

For All Purposes.

Special Finest CAST STEEL WIRE,
MARKET STEEL WIRE, PRIME COPPERED SPRING WIRE, TEMPERED AND
UNTEMPERED STEEL WIRES, IN LONG LENGTHS, FOR CRINOLINE, CORSET,
LOCK AND BRUSH MAKERS, AND ALL SPECIAL PURPOSES.

ALL KINDS OF FURNITURE SPRINGS.

IRON STEEL, & RAILS
OF EVERY DESCRIPTION.

WIRE RODS, PLAIN AND GALVANIZED WIRES, &c.,
GUN BARRELS, MOULDS, AND ORDNANCE.

Shipments in bond from American Ports and direct from Europe to all parts of the World.

EXPORTERS AND GENERAL MERCHANTS.

WORKS, PEEKSKILL, N. Y.

Direct all communications of the

OFFICE & WAREHOUSE, 93 John St., New York.

MILLER, METCALF & PARKIN, Pittsburgh, Pa., CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.

Polished, Compressed Drill Rods and Wire,

Warranted equal to any imported in quality, finish and accuracy.

Also Common Grades.

J. & RILEY CARR, SHEFFIELD, England.

Sole Importers and Manufacturers of the

Celebrated "Dog Brand"
FILES AND RASPS.

EVERY FILE

WARRANTED "HAND CUT"

And made from our own CAST STEEL, specially manufactured for
the purpose. A large and well-assorted stock on hand or promptly imported to order. Also

SUPERIOR STEEL
for Lathe Tools, Granite Rock Drills, Chisels, Masons' and Miners' Tools, Files, Cutlery and Edge Tools.
SHEET CAST STEEL, for Cotton Ginsaws, Knife, Lock and other Springs, Saws, Cutlery, Machine
Knives, Stamping Cold, &c.
BRIGHT COLD ROLLED STEEL, for Clock, Lock, Corset and other Springs, Keys, Stamp-
ing Cold, &c.
WEDES SPRING, German Machinery and all other descriptions for agricultural and machinist
purposes.
WAREHOUSE, 30 Gold St. (near John St.), NEW YORK.

S. & C. WARDLOW,

Sheffield, England,

Manufacturers of the Celebrated

Cast and Double Shear
STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives, Mining
Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

Cleveland Rolling Mill Co.,

Manufacturers of

BESSEMER STEEL
AND
Iron Rail and Fastenings,
SPRING STEEL

WIRE OF ALL KINDS,
Tire, Axles and other Forgings,

Roller Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and
Siding of Siemens-Martin, Bessemer Steel and Iron.

CLEVELAND, OHIO.

Western Agency,

91 Lake Street, Chicago.

N. D. PRATT, Agent.

New England Agency,

239 Franklin Street, Boston.

JOHN WALES & CO., Agents.

THE MIDVALE STEEL CO., NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools,
Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills,
Extra Mild Center Steel, special for Taps;

MACHINERY AND CAST SPRING STEEL HEAVY AND LIGHT FORGINGS.

Warehouse, No. 12 North 5th St., Philadelphia.

Address A. M. F. Watson, General Sales Agent.

STEEL Gautier Steel.

See Page 2.

LABELLE STEEL WORKS.

SMITH, SUTTON & CO., STEEL.

MANUFACTURERS OF ALL KINDS OF

Also Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny,
Post Office Address, Pittsburgh, Pa.

Represented at Boston by WETHERELL BROS., at Oliver St.; at Philadelphia by JAMES C. HAND & CO.,
614 and 616 Market St.; at Cleveland by CONdit, WICK & CO., 155 Water St.

ALBANY & RENSSLAER IRON & STEEL CO., Troy, N. Y.,

Office in New York City, 56 Broadway,

MANUFACTURERS OF

BESSEMER STEEL RAILS,
Machinery Steel, Merchant and Ship Iron.
HORSE SHOES.

SAM'L G. B. COOK & CO., Agents for Southern States,
67 and 69 German Street, Baltimore, Md.

FRANCIS HOBSON & SON 97 John Street, NEW YORK,

Sole Manufact'rs of **"CHOICE"** Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS. HUGILL, Agent.

GEO. SANDERSON & CO.,

MANUFACTURERS AND

Importers of STEEL,

Removed to 30 Gold Street, New York.

Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS,
TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for
CLOCK SPRINGS, CORSET CLASPS, &c.

A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

Warranted Superior to any Steel in the Market, either
English or American, for every purpose.

CHROME CAST STEEL.
Combination Chrome Steel and Iron for
Safes, Jails and Deposit Vaults.
Send for Circular
and
Price List.

Chrome Steel Works
Kent Avenue and Keap Street,
BROOKLYN, E. D., N. Y.
Chicago Branch,
40 Dearborn Street,
Cincinnati Branch,
123 Central Avenue,

LOW MOOR IRON COMPANY,
Alleghany Co., Virginia.

PIC IRON.

Best Foundry Iron for Sale in Lots to Suit.

GEO. H. WHIPPLE, 56 Wall St., New York.

GUTE HOFFNUNG'S HUTTE,

(Works of Good Hope.)

Established 1781.

OBERHAUSEN, ON RUHR.

8500 men employed.

BRAND:

G. H. H.

STEEL RAILS, STEEL WIRE RODS,
STEEL BLOOMS, SPIEGELEISEN,
FERROMANGANESE UP TO 80 PER CENT.
GODEFFROY & CO., Sole Agents for the United States
43 New Street, NEW YORK.

CONNELLSVILLE
J. M. SCHOONMAKER,
MANUFACTURER AND SHIPPER OF
CONNELLSVILLE COKE.

Capacity of Mines, 2500 Tons Daily.

Siding connections with all lines of Railroads.

Office, 120 Water Street, PITTSBURGH, PA.

COKE

R. MUSHET'S Special Steel

FOR

LATHES, PLANERS, &c.

Turns out at least double work by increased speed
and feed, and cuts harder metals than any other
steel. Neither hardening nor tempering required.

Sole Makers,

SAMUEL OSBORN & CO.,
Sheffield, England.

Represented in the United States by

B. M. JONES & CO.,
Nos. 11 & 13 Oliver Street, BOSTON.

NAYLOR & CO.,

99 John St., New York. 6 Oliver St., Boston, Mass.

208 S. Fourth St., Philadelphia, Pa.

IMPORTERS OF

STEEL AND IRON RAILS,
Tin and Terne Plates,
Swedish and Norway Iron,
BESSEMER STEEL WIRE RODS
Pig Iron, Spiegeleisen, Ferroman-
ganes, Scrap Steel and Old
Iron Rails.

MANUFACTURERS OF

STEEL COMPRESSED SHAFTING,
"Benzon" Homogeneous Plates
For Boilers, Fire-boxes, &c.

Axles, Crank Pins, Spring Steel,
And all other kinds of

Martin-Siemens Steel and Iron
For Railroad purposes.

BUDD & ELLIS,

New York, 23 Cliff St. 10 Oliver St., Boston.

Sole Agents for the United States for

Langlois Scotch Pig Iron,

And for the

BESSEMER STEEL WIRE RODS

Of Krueger & Co., Haaspe, Westphalia.

Importers of

SILESIA SPALTER & METALS.

Sole Agents for the United States of the Union

Co. of Dortmund, makers of Steel Rails, Blooms, &c.

All descriptions of Iron and Steel Railroad Equip-
ments.

THE VERONA TOOL WORKS.

METCALF, PAUL & CO.,

Manufacturers of

Solid Steel Mining and Railroad Picks,

Blacksmith's Sledges, Striking Hammers,

Woodchopper's Wedges and Sledges,

Mining, Quarry and Railroad Tools of the best ma-
terial and workmanship only. All tools are stamped
with our name and trade mark, and fully warranted.

Pittsburgh, Pa., Western Branch:

7th Avenue and Liberty Street. CHICAGO, ILL., 22 West Lake St.

Trade Mark.

IRON ROOF CRESTING,

WEATHER VANES,

Tower Ornaments, &c.

Also,

Wrought Iron Fence,

For Residences, Court

Houses, Cemetery

Lots, &c.

IRON SHUTTERS,

WINDOW GUARDS,

Balcony Railing, &c.

Parties wanting work in

this line will be furnished

illustrated catalogue and

price list upon application.

Manufactured by

E. T. Barnum's Iron

and Wire Works,

Detroit, Mich.

Established 1838.

Bevin Bros. Mfg.

Co.,

Easthampton, Ct.

Manufacturers of

SLEIGH BELLS,

House, Tea, Hand,

Gong Bells, &c.

Bell Metal Kettles.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.

237 South Third St.,

PHILADELPHIA,

No. 111 Broadway, New York.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh

Coals are mined by ourselves and firms connected

with us, viz.

A. Pardee & Co. { HAZLETON,

Pardee, Bro. & Co. { CRANBURY,

Calvin Pardee & Co. { SUGAR LOAF,

Pardee, Sons & Co. { LATTIMER,

Pardee, Sons & Co. { HOLLYWOOD,

Pardee, Sons & Co. { MT. PLEASANT,

CARNEGIE BROS. & CO., LIMITED,THOS. M. CARNEGIE,
Chairman.

PITTSBURGH, PA.

D. A. STEWART,
Treasurer.**EDGAR THOMSON STEEL WORKS DEPARTMENT.**

Works at Bessemer Station, P. R. R.

Branch Office and P. O. Address, 48 Fifth Ave.,

MANUFACTURERS OF

**Union Iron Mills Department**

Mills at Thirty-third St. and A. V. R. R.

Branch Office and P. O. Address, Thirty-third St.

MANUFACTURERS OF

STRUCTURAL IRON.

Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees, Universal Mill Plates, Bar Iron, Light Steel and Iron Rails.

Special attention given Unusual Shapes and Sizes.

Lithographs of sections and book of detailed information giving calculation of strain, &c., furnished to Engineers and Architects on application.

NEW YORK OFFICE: Room 32, No. 55 Broadway, N. Y.

NORTH CHICAGO ROLLING MILL CO.

ESTABLISHED 1857.

CAPITAL, \$3,000,000.

INCORPORATED 1859.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL, IRON RAILS & BESSEMER STEEL RAILS.

Fish Plates.....	13,000 tons.
Merchant Bar.....	40,000 "
Pig Metal.....	140,000 "
Iron Rails.....	110,000 "
Steel Rails.....	100,000 "
Total Capacity per year.....	403,000 "

OFFICES.

17 Metropolitan Block, Chicago, Ill.
17 Mitchell Block, Milwaukee, Wis.O. W. POTTER, President, Chicago.
N. THAYER, Jr., Vice President, Boston.
S. CLEMENT, Treasurer, Milwaukee.
R. C. HANNAH, Secretary, Chicago.**THE MONTGOMERY IRON & STEEL COMPANY,**

WORKS AT DANVILLE, PA.

PIG IRON, T AND STREET RAILS.

A general assortment of mine and narrow gauge rails kept on hand, from which shipments can be made promptly.

W. E. COKE, President,
Reading, Pa.S. W. INGERSOLL, Treasurer,
208 South Fourth St., Philadelphia, Pa.

HUGH McNEILL, Chairman.

JNO. C. PORTER, Sec'y and Treas.

THE SPANG STEEL AND IRON CO., Limited,
MANUFACTURERS OF
OPEN HEARTH STEEL,

BLOOMS, FLAT BAR, BILLETS, ROUNDS, AND ANGLES, SQUARES,

Steel for Agricultural and other Purposes.

UNIVERSAL MILL PLATES

Of Steel and Iron, up to 30 inches wide, and of any desired thickness and length.

Address, PITTSBURGH, PA.

THE CLEVELAND CRUCIBLE STEEL CO.

Manufacturers of

TOOL, MACHINERY, SPRING, TIRE, STEEL.

Warranted equal to any made.

CLEVELAND, OHIO.

PITTSBURGH BESSEMER STEEL CO.

(LIMITED),

STEEL RAILS

LIGHT RAILS A SPECIALTY.

P. O. Address, 87 Wood Street, Pittsburgh, Pa.

THOS. FIRTH & SONS, Limited,

SHEFFIELD,

Crucible Cast Steel.

JERE. ABBOTT & CO.,

AGENTS AND IMPORTERS OF

SWEDISH IRON,

35 Oliver St., BOSTON.

23 Cliff St., NEW YORK.

W. J. LEWIS, Chairman.

HENRY LLOYD, Secretary.

M. D. W. LOOMIS, Treasurer.

LINDEN STEEL COMPANY, LIMITED,

MANUFACTURERS OF

OPEN-HEARTH STEEL.

Ingots, Blooms, Billets, Slabs, Spring, Tire, Rod, Agricultural and Other Steels.

Correspondence in reference to special shapes, sizes and qualities specially solicited.

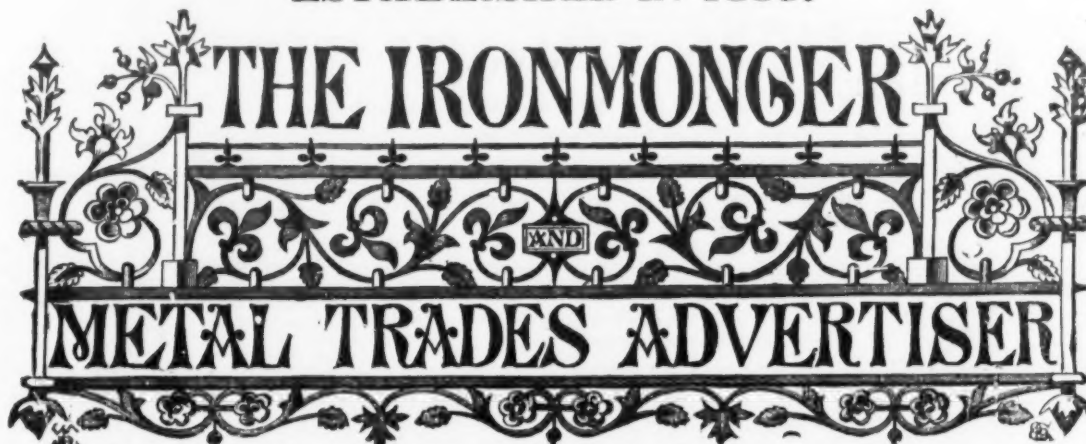
Office, No. 173 Wood St.,

PITTSBURGH, PA.

Works, Linden Station, B. & O. R. R.

SOLD EVERYWHERE.
MANUFACTURED ONLY BY**ST. LOUIS STAMPING CO.,**
ST. LOUIS, MO.
NEW YORK OFFICE, 57 Beekman St.
List on Application.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

NEW YORK OFFICE: DAVID WILLIAMS, Publisher of *The Iron Age*, 83 Reade street, who will, on receipt of application supply specimen copies free.PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS, Manager and Associate Editor.
PHILADELPHIA OFFICE: 220 South Fourth Street—THOMAS HOBSON, Manager.CINCINNATI OFFICE: Builders' Exchange—T. T. MOORE, Manager.
SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chicago, Tenn.—S. B. LOWE, Manager.**SPECIAL FEATURES.**

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Week, Legal News, Trade Notes, Bankruptcies, Foreign Notes, Colonial Settings, Merchants' Circulars, &c.*, are each departments of the journal containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes French Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger and Metal Trades Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

ADVERTISEMENTSare inserted in the *Ironmonger and Metal Trades Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

Size of Page—Nine inches Deep by Six inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary and Text Book*, published toward the end of each year, and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION, each net.
One page.....	Gold. \$20.00	Gold. \$22.50	Gold. \$25.00	Gold. \$30.00	Gold. \$35.00	Gold. \$50.00
Two-thirds page.....	15.00	16.00	18.75	22.50	26.25	37.50
Half page.....	11.00	12.00	13.75	16.50	19.25	27.50
One-third page.....	8.00	9.00	10.00	12.00	14.00	20.00
Quarter page.....	6.40	7.25	8.00	9.60	11.20	16.00
One-sixth page.....	4.50	5.10	5.65	6.75	7.75	11.40
One-eighth page.....	3.60	4.10	4.50	5.40	6.25	9.00
One-sixteenth page.....	2.00	2.25	2.50	3.00	3.50	5.00

SPECIAL ISSUES.

In the spring and autumn of each year there is published a Special Issue, the circulation of which is not less than Twelve Thousand (12,000) copies.

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every subscriber to the *IRONMONGER AND METAL TRADES ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,

With which is incorporated The Universal Engineer,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:

SEPTEMBER 2 and 30, OCTOBER 28, NOVEMBER 25, DECEMBER 23, 1882; JANUARY 20, FEBRUARY 17, MARCH 10, APRIL 7, MAY 5, JUNE 2 and 30, JULY 28, and AUGUST 25, 1883.

This Supplement is published in

FOUR LEADING COMMERCIAL LANGUAGESof the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFF.

Size of Page—13½ inches Deep by 9½ inches Wide.

	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.		13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.
One page.....	Gold. \$30.00	Gold. \$33.75	Gold. \$37.50	Quarter page.....	Gold. \$10.00	Gold. \$11.25	Gold. \$12.50
Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	7.50	8.45	9.40
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.25	7.00	7.75
One-third page.....	12.50	14.10	15.65	One-sixteenth page.....	3.25	3.40	3.75

Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language or be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE

so far as experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or advertisement inserted in the *Ironmonger* and *Foreign Supplement* is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.

HENRY DISSTON & SONS,

KEYSTONE SAW, TOOL, STEEL & FILE WORKS,

Front and Laurel Streets,

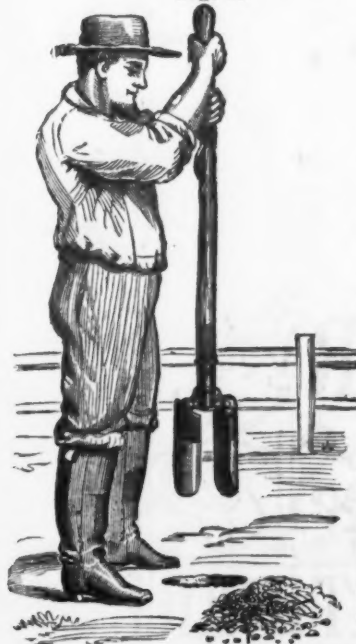
PHILADELPHIA.

DISSTON'S SAMSON TREE PLANTER AND POST HOLE DIGGER.

Fig. 1.

Patented May 29, 1879.

Fig. 2.



Price, - - - \$37.50 per dozen.

No Farmer, Nurseryman, Railroad
or Telegraph Company
SHOULD BE WITHOUT ONE.

NO BACK-ACHE.

NO KNEE-WORK.

NO CLOGGING.

This tool has been thoroughly tested, and has given the greatest satisfaction to all who have tried it. The principle on which it works makes it self-cleaning and prevents adhesion in sticky soil; therefore it always works free and easy. It is far superior to all plungers, augers and boring machines, as it works well in stony, sandy, or clay soils; quicksand under water is as easily removed as though no water existed.

DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

HENRY DISSTON & SONS.

BROWER & LEEDS,

81 Murray Street, NEW YORK,

SOLE AGENTS IN THE UNITED STATES FOR

BAYLISS' HURRICANE BELLOWS,

Portable Forges and Hot Blast
and Water Tuyeres.

SUPERIOR TO ANY.

Send for Circulars.

Office and Factory, Cor. Easton & Barton Streets, ST. LOUIS.

SHULTZ BELTING COMP'Y,

MANUFACTURERS OF

Shultz Patent Fuled Leather Belting and Lace Leather.

Our BELTING is made of Leather, tanned on the surfaces only; the interior (which is the Fiber and strength of the hide) is not tanned, but rawhide fuled and softened by our patented process. Our Belting is more pliable, and hugs the pulley better, and transmits more power than any other belt. Our Rawhide Lace Leather and Belt Grease, are the best in use.

VALVES FOR FURNACES AND IRON WORKS.

We make out of our Patent Leather, Valves for furnaces which we claim last five times as long as any other. We will furnish for trial \$5.00 worth, without charge, to each of the first ten parties sending us sizes. We also send a useful little book on Belting free, on application. Agents in all important cities.



Cuyahoga Falls, Ohio.

Tinned
Belt Rivets
AND
Burrs a Specialty.

EASTERN AGENTS,
Alford, Ward, Davenport & Co.
85 Chambers St., New York.

MORSE TWIST DRILL AND MACHINE CO.

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers,
BIT STOCK DRILLS,

DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL
PRESSES. BEACH'S PATENT SELF-CENTERING CHUCKS, CENTER
AND ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS.
DRILL GRINDING MACHINES. TAPER REAMERS, MILLING
CUTTERS AND SPECIAL TOOLS TO ORDER.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt.

EDWARD S. TABER, Treas.



WITHROW & GORDON,
Engineers & Contractors
PITTSBURGH, PA.

Agents for the

WHITWELL HOT BLAST STOVES.

OVER 600 IN USE.

The following parties either have them in
under construction:
Cedar Point Iron Co., N. Y.
Dunbar Furnace Co., Pa.
Crane Iron Co., Pa.
Pennsylvania Steel Co., Pa.
Neshaminy Iron Co., Pa.
R. H. Coleman, Lebanon, Pa.
Chester Rolling Mill Co., Pa.
Davenport, Fairbairn & Co., Pa.
Isabella Furnace Co., Pa.
Faxon Furnace, Pa.
Spearman Iron Co., Pa.
Eina Iron Works, Ohio.
Milton Coal and Iron Co., Ohio
Wilson Furnace Co., Ohio.
Moss & Marshall, Ohio.
H. Campbell & Sons, Ohio.
Hocking Valley Iron Co., Ohio.
Cleveland Rolling Mill Co., Ohio.
Meier Iron Co., Ill.
North Chicago Steel Co., Ill.
Union Iron and Steel Co., Ill.
Means & Culbertson, Ky.
Ashland Furnace Co., Ky.
Norton Iron Co., Ky.
Southern States C. I. and S. Co., Tenn.
Sevance Furnace Co., Tenn.
James C. Warner, Rising Fawn, Ga.
Ohio Iron Co., Zanesville, O.
Bloss Furnace Co., Ala.

GEORGE W. BRUCE,

1 PLATT ST., NEW YORK.

Proprietor of the ATLANTIC SCREW WORKS,
Agent for the Florence Tack Co.,

AND SOLE AGENT FOR

C. A. Maynard's Trowels.

A full stock of all Patterns. London, N. Y.
Philadelphia, Boston, Lowell and Portland on hand.
Every Trowel warranted.

WIRE RODS. Spring
quality, of Bessemer
and other
Steel. Superior
value. F. O. B.
Liverpool.

A. C. LESLIE & CO., Montreal.



Prouty's Patent PEERLESS FORCE PUMP.

Has Self-Adjustable Foot Rest.

NEW AUTOMATIC COMPENSATING
PACKING.

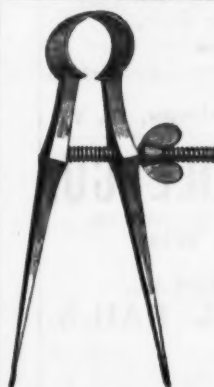
It will throw a continuous jet FROM
FORTY TO SIXTY FEET. A new pattern
jet and spray nozzle is sent with
each pump.

Especially attention is called to the
material and workmanship exhibited
in these pumps.

LIST PRICE, \$8.

THE NEW ENGLAND BUTT CO

PROVIDENCE, R. I.



J. STEVENS & CO.,

Chicopee Falls, Mass., P. O. Box 224,

Manufacturers of

SPRING CALIPERS AND DIVIDERS

Also, Surface Gauges and Counter Sinks, Stevens' Patent
Breech-Loading Sporting Rifles, double and single barrel; Shot
Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet
Rifles. Our

SHOOTING GALLERY RIFLE

Is the favorite everywhere.

ELBA IRON & BOLT CO., Limited.

MANUFACTURERS OF

MERCHANT BAR IRON,

Skelp Iron, Splice Bars, Railway Track Bolts, Car, Bridge,
and Machinery Bolts, Nuts, &c.

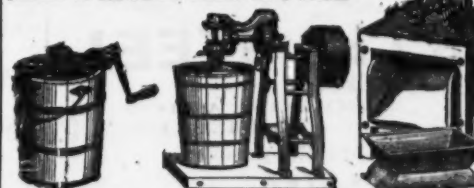
We invite the attention of RAILROAD MEN especially to our make of SPICE BARS and Track
bolts. Using the best brands of REFINED IRON, and paying close attention to the finish of our
manufactures, we are enabled to offer our patrons BOLTS, NUTS, SPICE BARS &c., of excellent
quality. Our works have been enlarged within a few years; all orders are now executed with prompt-
ness; all our work guaranteed.

SEND FOR PRICE LISTS AND INFORMATION TO

ELBA IRON & BOLT CO. Limited, Pittsburgh, Pa.
LOVEJOY & DRAKE, 49 Cortlandt Street, New York, Agents.

SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

THE WHITE MOUNTAIN FREEZER COMPANY are headquarters for Ice Cream Freezers and Ice
crushers, being the only firm in the United States who manufacture all parts of the raw material. The
freezing Committee, consisting of 50,000
business of the United States have recom-
mended the Sands' Triple Motion
White Mountain Freezer to all per-
sons in the world for the following rea-
sons: We have used them; they freeze
quicker than any other; they save time,
salt and ice; the triple motion makes
smooth cream without lumps; makes
more of it; galvanizes iron outside; tin
inside; no zinc in contact with the
cream; easily adjusted; substantial-
made; simple in construction; perfect
in results. Send for descriptive circular
and discount of this celebrated Freezer.
Address,



HAND FREEZER.
21 0 25 qts.
\$4.50 to \$15.00.

HAND OR POWER
21 and 40 qts.
\$7.50 and \$17.50.

HAND OR POWER
ICE CRUSHER.
\$7.50.

White Mountain Freezer Co.,
Nashua, N. H., U. S. A.

SPECIAL ATTENTION GIVEN TO EXPORT ORDERS.

BEECHER & PECK,

Successors to Milo Peck, Manufacturers of



PECK'S DROP LIFTER is the only one which has its parts
cushioned. Being thus cushioned they are the most durable Lifter in
the market.

Can be attached to any drop now in use.

Send for Illustrated Catalogue.

Cor. Lloyd and River Sts.,

New Haven, Conn.

The Humane Calf Weaner



The Perfect Hog Ring and Stock Mark.

One instrument does for both purposes. The only Ring that in-
jures the joint outside and makes a lock joint. The Humane Calf
Weaner is as easy on a calf's head as a halter and as sure to stay.
Samples and descriptive circulars furnished.

J. H. BROWN & CO., Mfrs. Hardware Specialties,
OTTAWA, ILL.

THE 'MOUNT CARMEL' OX SHOE.



Steel Toe Calk.
FINISHED READY FOR NAILING ON.

WARRANTED

The Best and Cheapest Shoe Made.

IVES, WOODRUFF & CO.

Manufacturers,
MOUNT CARMEL, CONN.

For sale by dealers in blacksmiths' supplies.

NOVELTY IRON FOUNDRY.

HAIGHT & CLARK, 16 & 18 De Witt St., Albany, N. Y.

Manufacturers of

FINE GRAY IRON CASTINGS OF EVERY DESCRIPTION.

Rosettes and Pickets for Wire Workers, Castings for Furniture and Piano
Manufacturers. Iron and Metal Patterns of all kinds a Specialty.

Correspondence solicited for JAPANNING, COPPERING, BRONZING.

PHILADELPHIA.

Corrected Weekly by Lloyd, Sipple & Walton.
Terms, 30 days. For 60 or 90 days, interest added at 10% per cent. per annum.

Anvils.
Peter Wrights, W. B. 10 1/2
Over 100 lbs. 110
Trenton 10 1/2
Apple Parers.
Globe Apple Parer \$5.00 net
Penn Apple Parer \$5.00 net
Lots of 10 to 25 dozen special price
Bay State Peach Parer \$5.00 net

Axes.
Hunt's Kentucky and Yankee per doz \$10.00 to \$15.00
Robert Mann \$9.00 to \$12.00
Richland Chief \$8.50 to \$12.00
Beveled Axes \$10.00 net
Double Bit Axes \$10.00 to \$20.00

Augers and Auger Bits.—New List January 7, 1892.
Bates' Nut Augers \$10.00 to \$15.00
Cook's Augers \$10.00 to \$15.00
W. A. Brown Ship Augers \$10.00 to \$15.00
Benjamin Pierce Auger Bits \$10.00 to \$15.00
Cook's Auger Bits \$10.00 to \$15.00
Jennings' Auger Bits \$10.00 to \$15.00
Bonney's Pat. Hot Augers, list \$2.50 doz. \$15.00 to \$20.00
Stearns' Pat. Hot Augers, list \$2.50 doz. \$15.00 to \$20.00

Balances.
Light and Common \$10.00 to \$15.00
Bells.
Bells Bros. Mfg. Co. Light Hand Bells \$10.00 to \$15.00
Swiss Pattern Hand Bells \$10.00 to \$15.00
Connell's Door Bells \$10.00 to \$15.00
G. L. Western & Kentucky Cow, new list \$10.00 to \$15.00

Boring Machines.
Upright, without Augers \$10.00 to \$15.00
Angular, without Augers \$10.00 to \$15.00
Boileau—Eastern Carriage Bells \$10.00 to \$15.00
Stanley, Wrought Shutter \$10.00 to \$15.00

Braces.—Barber's
Hacks \$10.00 to \$15.00
Sprocket \$10.00 to \$15.00
American Mail \$10.00 to \$15.00

Butts.—Cast Fast Joint, Narrow \$10.00 to \$15.00
Cast Loose Joint, Narrow \$10.00 to \$15.00
Acorn Loose Pin \$10.00 to \$15.00
Mayer's Loose Joint \$10.00 to \$15.00
Wrought Loose Pin \$10.00 to \$15.00
Table Hinges and Back Flaps \$10.00 to \$15.00
Narrow Fast \$10.00 to \$15.00
Loose Joint \$10.00 to \$15.00

Blind Butts.
Parker \$10.00 to \$15.00
Shepard \$10.00 to \$15.00
Lull & Porter \$10.00 to \$15.00
Huffer's \$10.00 to \$15.00

Chains.—German Halter and Coll. list December 31, 1891.
Galvanized Pump Chain \$10.00 to \$15.00
Best Proof Coll Chain \$10.00 to \$15.00
Best Proof Coll Chain \$10.00 to \$15.00

Chisels.—Socket Framing \$10.00 to \$15.00
Socket Firmer \$10.00 to \$15.00
Butcher's \$10.00 to \$15.00

Casters.—Bed (new list July 1, 1892). \$10.00 to \$15.00
Plate \$10.00 to \$15.00
Coffee Mills, Box and Side, new list Jan. 1, 1892. \$10.00 to \$15.00
Enterprising \$10.00 to \$15.00

Cutlery.—Walden Pocket \$10.00 to \$15.00
Penna. Knife Co. \$10.00 to \$15.00
Landers, Fry & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' price net.

Drawing Knives.
Hart Mfg. Co. \$10.00 to \$15.00
Adjustable Hand \$10.00 to \$15.00

Fry Pans.
Timed \$10.00 to \$15.00
No. 1 \$10.00 to \$15.00
No. 2 \$10.00 to \$15.00
No. 3 \$10.00 to \$15.00
No. 4 \$10.00 to \$15.00
No. 5 \$10.00 to \$15.00
No. 6 \$10.00 to \$15.00
No. 7 \$10.00 to \$15.00
No. 8 \$10.00 to \$15.00
No. 9 \$10.00 to \$15.00
No. 10 \$10.00 to \$15.00

Files.
Nicholson \$10.00 to \$15.00
Disston \$10.00 to \$15.00
Butcher \$10.00 to \$15.00

Finishing Machines.
Knap \$10.00 to \$15.00
Crown \$10.00 to \$15.00
Geneva Fluter \$10.00 to \$15.00
Favorite com. Fluter & Sand Iron \$10.00 to \$15.00

Flamers.
Verkes & Plumb's new list \$10.00 to \$15.00
Mayfield Hammer \$10.00 to \$15.00
Howell & L. Nail Hammer \$10.00 to \$15.00

Handles.
Disston Loop Handles Crosscut \$10.00 to \$15.00
Boryston Loop Handles Crosscut \$10.00 to \$15.00
Hatchets.
Verkes & Plumb, new list \$10.00 to \$15.00
Hunt \$10.00 to \$15.00

Hinges.
Strap and T \$10.00 to \$15.00
Barnes \$10.00 to \$15.00
Ausable \$10.00 to \$15.00

Knives.
Blind and Pointed \$10.00 to \$15.00
Globe \$10.00 to \$15.00
Clinton \$10.00 to \$15.00

Knives.
Black-mouth Favorite, all sizes \$10.00 to \$15.00
Discount on Ausable, 20% to 30%; Clinton, 20% to 30%
Globe, 20%

Hay and Straw Knives.
Lightning \$10.00 to \$15.00
Wadsworth \$10.00 to \$15.00
Walton Straw Knives \$10.00 to \$15.00

Locks and Latches.
Brantford \$10.00 to \$15.00
Gardner Cabinet \$10.00 to \$15.00
American Padlock \$10.00 to \$15.00

Lawn Mowers.—Pennsylvania \$10.00 to \$15.00
Philadelphia \$10.00 to \$15.00
Lawn and Garden Pumps \$10.00 to \$15.00

Mattocks.
Long and Short Cutters \$10.00 to \$15.00
Pennsylvania Pattern \$10.00 to \$15.00

Machinists.
Enterprise Mfg. Co.'s Measuring Faucets \$10.00 to \$15.00
Lincoln's \$10.00 to \$15.00
Landers, Fry & Clark's Petroleum \$10.00 to \$15.00

Meat Cutters.
Dixon's \$10.00 to \$15.00
Woodruff \$10.00 to \$15.00
Stowe \$10.00 to \$15.00

Planes.
American Pattern \$10.00 to \$15.00
Scandinavian Padlocks \$10.00 to \$15.00
No. 1 \$10.00 to \$15.00
No. 2 \$10.00 to \$15.00
No. 3 \$10.00 to \$15.00
No. 4 \$10.00 to \$15.00
No. 5 \$10.00 to \$15.00
No. 6 \$10.00 to \$15.00
No. 7 \$10.00 to \$15.00
No. 8 \$10.00 to \$15.00
No. 9 \$10.00 to \$15.00
No. 10 \$10.00 to \$15.00

Pumps.
Lawn and Garden Pumps \$10.00 to \$15.00
Enterprise Mfg. Co. \$10.00 to \$15.00
Lincoln's \$10.00 to \$15.00

Razor Straps.
Lampont Combination \$10.00 to \$15.00
Imitation Emerson \$10.00 to \$15.00
Stanley Ivory \$10.00 to \$15.00

Shovels and Spades.
Oliver Ames & Sons, new list \$10.00 to \$15.00
Grubbs \$10.00 to \$15.00
Rowland \$10.00 to \$15.00

Saws.
Hudson City Stone No. 1 \$10.00 to \$15.00
A. O. Stone No. 2 \$10.00 to \$15.00
Saws \$10.00 to \$15.00

PITTSBURGH.

Merchandise Iron.
Terms.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.
The following are card rates.

1/4 to 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
1/2 to 1 by 1/2 to 1 inch \$10.00 to \$15.00
1 to 1 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
1 1/2 to 2 by 1/2 to 1 inch \$10.00 to \$15.00

2 to 2 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
2 1/2 to 3 by 1/2 to 1 inch \$10.00 to \$15.00
3 to 3 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
3 1/2 to 4 by 1/2 to 1 inch \$10.00 to \$15.00

4 to 4 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
4 1/2 to 5 by 1/2 to 1 inch \$10.00 to \$15.00
5 to 5 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
5 1/2 to 6 by 1/2 to 1 inch \$10.00 to \$15.00

6 to 6 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
6 1/2 to 7 by 1/2 to 1 inch \$10.00 to \$15.00
7 to 7 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
7 1/2 to 8 by 1/2 to 1 inch \$10.00 to \$15.00

8 to 8 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
8 1/2 to 9 by 1/2 to 1 inch \$10.00 to \$15.00
9 to 9 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
9 1/2 to 10 by 1/2 to 1 inch \$10.00 to \$15.00

10 to 10 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
10 1/2 to 11 by 1/2 to 1 inch \$10.00 to \$15.00
11 to 11 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
11 1/2 to 12 by 1/2 to 1 inch \$10.00 to \$15.00

12 to 12 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
12 1/2 to 13 by 1/2 to 1 inch \$10.00 to \$15.00
13 to 13 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
13 1/2 to 14 by 1/2 to 1 inch \$10.00 to \$15.00

14 to 14 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
14 1/2 to 15 by 1/2 to 1 inch \$10.00 to \$15.00
15 to 15 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
15 1/2 to 16 by 1/2 to 1 inch \$10.00 to \$15.00

16 to 16 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
16 1/2 to 17 by 1/2 to 1 inch \$10.00 to \$15.00
17 to 17 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
17 1/2 to 18 by 1/2 to 1 inch \$10.00 to \$15.00

18 to 18 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
18 1/2 to 19 by 1/2 to 1 inch \$10.00 to \$15.00
19 to 19 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
19 1/2 to 20 by 1/2 to 1 inch \$10.00 to \$15.00

20 to 20 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
20 1/2 to 21 by 1/2 to 1 inch \$10.00 to \$15.00
21 to 21 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
21 1/2 to 22 by 1/2 to 1 inch \$10.00 to \$15.00

22 to 22 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
22 1/2 to 23 by 1/2 to 1 inch \$10.00 to \$15.00
23 to 23 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
23 1/2 to 24 by 1/2 to 1 inch \$10.00 to \$15.00

24 to 24 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
24 1/2 to 25 by 1/2 to 1 inch \$10.00 to \$15.00
25 to 25 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
25 1/2 to 26 by 1/2 to 1 inch \$10.00 to \$15.00

26 to 26 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
26 1/2 to 27 by 1/2 to 1 inch \$10.00 to \$15.00
27 to 27 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
27 1/2 to 28 by 1/2 to 1 inch \$10.00 to \$15.00

28 to 28 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
28 1/2 to 29 by 1/2 to 1 inch \$10.00 to \$15.00
29 to 29 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
29 1/2 to 30 by 1/2 to 1 inch \$10.00 to \$15.00

30 to 30 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
30 1/2 to 31 by 1/2 to 1 inch \$10.00 to \$15.00
31 to 31 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
31 1/2 to 32 by 1/2 to 1 inch \$10.00 to \$15.00

32 to 32 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
32 1/2 to 33 by 1/2 to 1 inch \$10.00 to \$15.00
33 to 33 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
33 1/2 to 34 by 1/2 to 1 inch \$10.00 to \$15.00

34 to 34 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
34 1/2 to 35 by 1/2 to 1 inch \$10.00 to \$15.00
35 to 35 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
35 1/2 to 36 by 1/2 to 1 inch \$10.00 to \$15.00

36 to 36 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
36 1/2 to 37 by 1/2 to 1 inch \$10.00 to \$15.00
37 to 37 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
37 1/2 to 38 by 1/2 to 1 inch \$10.00 to \$15.00

38 to 38 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
38 1/2 to 39 by 1/2 to 1 inch \$10.00 to \$15.00
39 to 39 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
39 1/2 to 40 by 1/2 to 1 inch \$10.00 to \$15.00

40 to 40 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
40 1/2 to 41 by 1/2 to 1 inch \$10.00 to \$15.00
41 to 41 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
41 1/2 to 42 by 1/2 to 1 inch \$10.00 to \$15.00

42 to 42 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
42 1/2 to 43 by 1/2 to 1 inch \$10.00 to \$15.00
43 to 43 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
43 1/2 to 44 by 1/2 to 1 inch \$10.00 to \$15.00

44 to 44 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
44 1/2 to 45 by 1/2 to 1 inch \$10.00 to \$15.00
45 to 45 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
45 1/2 to 46 by 1/2 to 1 inch \$10.00 to \$15.00

46 to 46 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
46 1/2 to 47 by 1/2 to 1 inch \$10.00 to \$15.00
47 to 47 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
47 1/2 to 48 by 1/2 to 1 inch \$10.00 to \$15.00

48 to 48 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
48 1/2 to 49 by 1/2 to 1 inch \$10.00 to \$15.00
49 to 49 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
49 1/2 to 50 by 1/2 to 1 inch \$10.00 to \$15.00

50 to 50 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
50 1/2 to 51 by 1/2 to 1 inch \$10.00 to \$15.00
51 to 51 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
51 1/2 to 52 by 1/2 to 1 inch \$10.00 to \$15.00

52 to 52 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
52 1/2 to 53 by 1/2 to 1 inch \$10.00 to \$15.00
53 to 53 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
53 1/2 to 54 by 1/2 to 1 inch \$10.00 to \$15.00

54 to 54 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
54 1/2 to 55 by 1/2 to 1 inch \$10.00 to \$15.00
55 to 55 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
55 1/2 to 56 by 1/2 to 1 inch \$10.00 to \$15.00

56 to 56 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
56 1/2 to 57 by 1/2 to 1 inch \$10.00 to \$15.00
57 to 57 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
57 1/2 to 58 by 1/2 to 1 inch \$10.00 to \$15.00

58 to 58 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
58 1/2 to 59 by 1/2 to 1 inch \$10.00 to \$15.00
59 to 59 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
59 1/2 to 60 by 1/2 to 1 inch \$10.00 to \$15.00

60 to 60 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
60 1/2 to 61 by 1/2 to 1 inch \$10.00 to \$15.00
61 to 61 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
61 1/2 to 62 by 1/2 to 1 inch \$10.00 to \$15.00

62 to 62 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
62 1/2 to 63 by 1/2 to 1 inch \$10.00 to \$15.00
63 to 63 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
63 1/2 to 64 by 1/2 to 1 inch \$10.00 to \$15.00

64 to 64 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
64 1/2 to 65 by 1/2 to 1 inch \$10.00 to \$15.00
65 to 65 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
65 1/2 to 66 by 1/2 to 1 inch \$10.00 to \$15.00

66 to 66 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
66 1/2 to 67 by 1/2 to 1 inch \$10.00 to \$15.00
67 to 67 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
67 1/2 to 68 by 1/2 to 1 inch \$10.00 to \$15.00

68 to 68 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
68 1/2 to 69 by 1/2 to 1 inch \$10.00 to \$15.00
69 to 69 1/2 by 1/2 to 1 inch \$10.00 to \$15.00
69 1/2 to 70 by 1/2 to 1 inch \$10.00 to \$15.00

Nails.

See Pittsburgh Trade Report.
Best Quality Roofing Cast Steel.
Square, Flat, Octagon and Round.

1/4 to 1/2 inches, inclusive \$10.00 to \$15.00
1/2 to 1 by 1/2 to 1 inches \$10.00 to \$15.00
1 to 1 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
1 1/2 to 2 by 1/2 to 1 inches \$10.00 to \$15.00

2 to 2 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
2 1/2 to 3 by 1/2 to 1 inches \$10.00 to \$15.00
3 to 3 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
3 1/2 to 4 by 1/2 to 1 inches \$10.00 to \$15.00

4 to 4 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
4 1/2 to 5 by 1/2 to 1 inches \$10.00 to \$15.00
5 to 5 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
5 1/2 to 6 by 1/2 to 1 inches \$10.00 to \$15.00

6 to 6 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
6 1/2 to 7 by 1/2 to 1 inches \$10.00 to \$15.00
7 to 7 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
7 1/2 to 8 by 1/2 to 1 inches \$10.00 to \$15.00

8 to 8 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
8 1/2 to 9 by 1/2 to 1 inches \$10.00 to \$15.00
9 to 9 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
9 1/2 to 10 by 1/2 to 1 inches \$10.00 to \$15.00

10 to 10 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
10 1/2 to 11 by 1/2 to 1 inches \$10.00 to \$15.00
11 to 11 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
11 1/2 to 12 by 1/2 to 1 inches \$10.00 to \$15.00

12 to 12 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
12 1/2 to 13 by 1/2 to 1 inches \$10.00 to \$15.00
13 to 13 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
13 1/2 to 14 by 1/2 to 1 inches \$10.00 to \$15.00

14 to 14 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
14 1/2 to 15 by 1/2 to 1 inches \$10.00 to \$15.00
15 to 15 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
15 1/2 to 16 by 1/2 to 1 inches \$10.00 to \$15.00

16 to 16 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
16 1/2 to 17 by 1/2 to 1 inches \$10.00 to \$15.00
17 to 17 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
17 1/2 to 18 by 1/2 to 1 inches \$10.00 to \$15.00

18 to 18 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
18 1/2 to 19 by 1/2 to 1 inches \$10.00 to \$15.00
19 to 19 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
19 1/2 to 20 by 1/2 to 1 inches \$10.00 to \$15.00

20 to 20 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
20 1/2 to 21 by 1/2 to 1 inches \$10.00 to \$15.00
21 to 21 1/2 by 1/2 to 1 inches \$10.00 to \$15.00
21 1/2 to 22 by 1/2 to 1 inches \$10.00 to \$15.00

PATENT RUBBER BUCKETS AND CHAIN FOR CHAIN PUMPS.



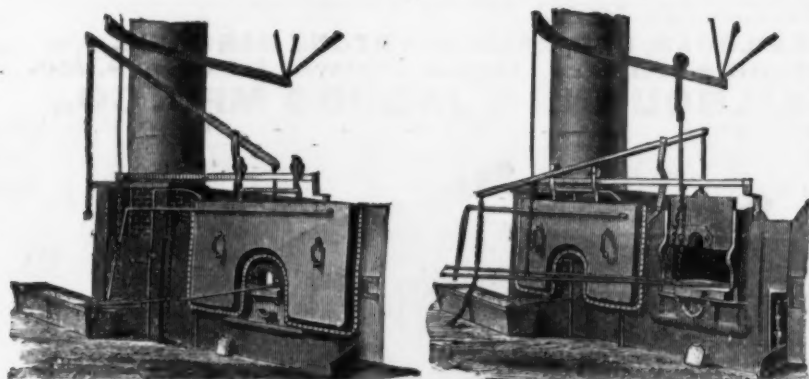
The only Perfect Expanding, Self-Draining Valve Bucket made. Our Patents cover the use of the Rubber, Nut and Bolt for Expanding, Tube and Valve for Draining. Order only the Rumsey Bucket, and avoid infringing.

SEND FOR SAMPLE.

L. M. RUMSEY MFG. CO., ST. LOUIS, MO.

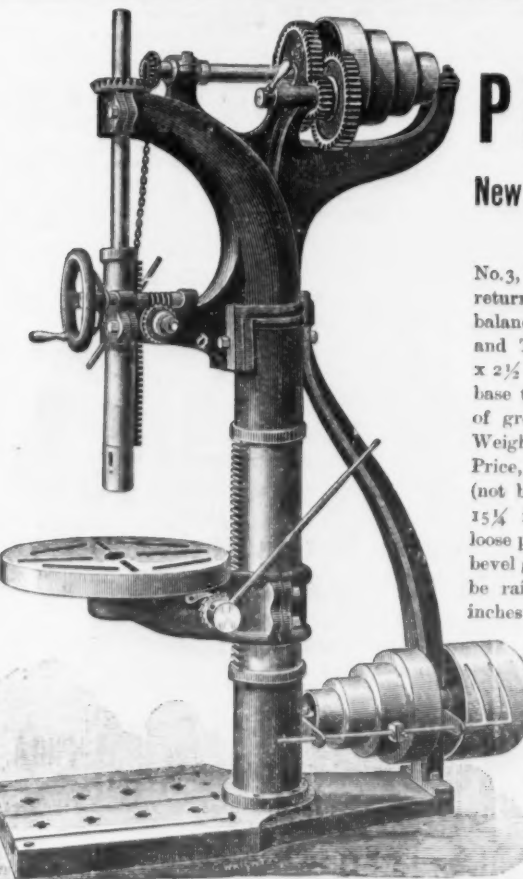
AMERICAN BOLT CO., Lowell, Mass.,
MANUFACTURERS OF
Bolts, Nuts, Washers, Chain Links, Car
Bolts, Bridge Bolts, Lag Screws, &c.

McDONALD'S PATENT SHIELD.



For Protecting the Men from Heat when Working in Front of
Puddling, Heating and other Furnaces.

H. McDONALD, Patentee,
MANAGER SLIGO ROLLING MILLS,
PITTSBURGH, PA.



DRILL PRESSES.

New Upright Power Drill
Presses.

No. 3, swings 21 in., back geared, quick return motion; large steel spindle, balanced in column; revolving Arm and Table; cut Gears; Pulleys, 10 x 2 1/2; a strong brace extends from base to column, stiffening it at point of greatest strain—a new feature. Weight, 1100 lbs.; height, 6 feet. Price, \$210. Smaller Size (not back geared), on legs, swing 15 1/2 inches; 4 speeds; tight and loose pulleys, 7x1 1/4; wheel feed, cut bevel gears, 12 inch iron table, can be raised and lowered; spindle 26 inches long, balanced by weight in column, with Morse taper hole; steel rack; weight, 225 lbs.; height, 5 feet. Net, \$85. Smallest Size, swing 13 in., lever feed, 3 speeds; tight and loose pulleys, to set on bench; weight, 45 lbs. Net, \$35.

PEERLESS PUNCH & SHEAR CO.,
38 W. Dey Street, New York.

NIAGARA STAMPING & TOOL CO.,
Manufacturers of

Presses, Dies and Tools

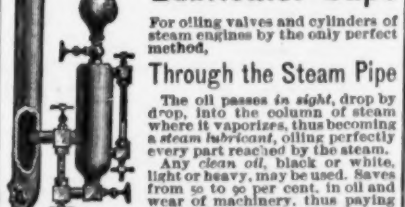
For Working Sheet Metal.

Fruit Can and Tanners Tools, &c.

Works, 147 and 149 Elm Street,

Near Clinton st., BUFFALO, N. Y.

THE DETROIT LUBRICATOR MFG. CO.'S CONTINUOUS FEED Lubricator Cups



For oiling valves and cylinders of steam engines by the only perfect method.
The oil passes in sight, drop by drop, into the column of steam where it vaporizes, thus becoming a steam lubricant, oiling perfectly every part reached by the steam. Any clean oil, black or white, light or heavy, may be used. Save from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty days trial, if desired. In ordering give diameter of cylinder.

NOTICE.—The first Lubricators ever made, showing the oil passing drop by drop through a transparent water chamber, were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us. Lubricators of every nature embodying the above feature, made by other parties, are encroachments upon our rights, and we will hold purchasers and users, as well as manufacturers, responsible in damages for such violations.

Address
DETROIT LUBRICATOR MFG. CO.,
Office, 98 Griswold St., Detroit, Mich.

First Prize at Fair American Institute and Millers' International Exposition, Cincinnati, 1886.

NOTE.—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their right-feed feature, a decree was rendered in our favor August 20, 1891.

GUN POWDER.

Lafin & Rand Powder Co.,
No. 39 Murray Street, New York.

Manufacture and sell the following celebrated brands of Sporting Powder known everywhere as
ORANGE LIGHTNING,
ORANGE DUCKING,
ORANGE RIFLE

more popular than any Powder now in use.

Blasting Powder and Electrical Blasting Apparatus.

Military Powder on hand and made to order.

SAFETY FUSE, FRICITION & PLATINUM FUSES.

Pamphlets showing sizes of grain sent free.

THE DUPLEX INJECTOR.

The Best Boiler Feeder Known.

Unequalled for simplicity and always reliable. Does not require adjustment for varying pressures of water. Will start when the injector is hot. Less liable to get out of order than a pump. Always delivers water hot to the boiler.

Manufactured and for Sale by
JAMES JENKS,
16 & 18 Atwater St., East,
DETROIT, MICH.

THACHER & CO.,

Manufacturers of

Chairs, Bed and Table, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

Chairs, Traces, etc., 10, 4, straight, etc.

J. F. WOLLENSAK'S

PATENT

Transom

Lifter

and Lock.

For all kinds

of Transoms,

Fanlights and

Skylights.

Send for catalogue

and price list.

J. F. WOLLENSAK,

Patentee and Sole Manufacturer,

CHICAGO, ILL.

T. NEW'S PREPARED ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.

BARRETT, ARNOLD & KIMBALL, Western Agents, Chicago, Ill.

Geo. A. Boynton BROKER IN IRON

TO WALL ST. N.Y.

BOSTON.

Reported by Macomber, Bigelow & Dowe.

Anvils.—"Eagle American"..... \$ 150.00

Anvil & Vice..... \$ 25.00

Agassiz & Hirsch's Ship Auger..... \$ 15.00

J. Hommedieu's Ship Auger..... \$ 15.00

Jennings's Bits..... \$ 10.00

Cook's Bits..... \$ 10.00

Shepardson's Double-Cut Bits..... \$ 10.00

Shepardson's Double-Gimlets..... \$ 10.00

Steam's Extension Hollow Augers..... \$ 10.00

Bonney's Extension Hollow Augers..... \$ 10.00

Platt's Bits..... \$ 10.00

Griswold Bits..... \$ 10.00

Axes.—Blue Jacks..... \$ 10.00

Red Cross..... \$ 10.00

Rest Cross..... \$ 10.00

Dowse Handled Boys..... \$ 10.00

Axe Handles..... \$ 10.00

Oak Extra, 31 in., No. A..... \$ 10.00

Oak Extra, 31 in., No. B..... \$ 10.00

Oak Extra, 31 in., No. C..... \$ 10.00

Oak Extra, 31 in., No. D..... \$ 10.00

Axe Clips..... \$ 10.00

Chattillon's..... \$ 10.00

Barn Door Rail..... \$ 10.00

Cutlery.—Pocket American Shear Co.'s..... \$ 10.00

Butcher Knives, Wood's, Lap Bolster..... \$ 10.00

Square Handle..... \$ 10.00

Staple Knives..... \$ 10.00

Lap Bolster, Oval Handle..... \$ 10.00

Sticking..... \$ 10.00

Butcher, Common Round Handle, Wood's..... \$ 10.00

Shoe Knives, Wood's..... \$ 10.00

Dividers.—Cook's..... \$ 10.00

Dog Collars..... \$ 10.00

Dog Muzzles.—Automatic..... \$ 10.00

Door Springs.—Torrey's Rod..... \$ 10.00

Imitation Torrey's Rod..... \$ 10.00

Gem Coll, new list..... \$ 10.00

Crown..... \$ 10.00

Warner's..... \$ 10.00

Door Steps.—Thurston..... \$ 10.00

Drawer Knobs.—Thurston's..... \$ 10.00

Drills.—More Ritt Stock..... \$ 10.00

More Straight Shank..... \$ 10.00

Emery.—Wellington Mills..... \$ 10.00

Walpole Emery Mills..... \$ 10.00

Turkish In 10 & 20 cans..... \$ 10.00

Enamelled Ware..... \$ 10.00

Standard Mfg. Co. Kettles..... \$ 10.00

Standard Sauce Pans..... \$ 10.00

Felted Plates.—Wrought..... \$ 10.00

Files.—American File Co..... \$ 10.00

Nicholson File Co..... \$ 10.00

Fluting Machines.—Knox list, \$1.00..... \$ 10.00

American list, \$3.40..... \$ 10.00

Forks.—W. C. & Co. Manure..... \$ 10.00

Gimlet Bits..... \$ 10.00

Genuine German, No. 125, 1-32 to 3-32, per doz \$1.00..... \$ 10.00

Pierce's..... \$ 10.00

Glass Cutters.—Combination Glass Cutter and Knife Sharpener..... \$ 10.00

Grab Hoes.—E. P. & Co's No. 2, \$1.50..... \$ 10.00

Hammers.—Maydole's..... \$ 10.00

Hartford Hammer Co..... \$ 10.00

Hangers & Rollers.—Anti-Friction..... \$ 10.00

Acme Rollers..... \$ 10.00

Climax..... \$ 10.00

Common Hangers..... \$ 10.00

Common Rollers..... \$ 10.00

Hand Screws..... \$ 10.00

Hatchets.—C. F. Dowse new list..... \$ 10.00

Underhill..... \$ 10.00

Hay Knives.—Lightning..... \$ 10.00

Fisher's Patent..... \$ 10.00

Hinges.—Strap and T new list..... \$ 10.00

Providence Plate..... \$ 10.00

Wrought Screw Hook..... \$ 10.00

Hoes.—W. C. & Co's..... \$ 10.00

Hooks and Staples.—Brewer's new list..... \$ 10.00

Horse Nails..... \$ 10.00

National Finished..... \$ 10.00

Putnam Pointed..... \$ 10.00

Horse Nails.—Bridgewater..... \$ 10.00

No. 6, 23; No. 7, 21; No. 8, 20; No. 9, 19..... \$ 10.00

Ice Cream Freezers.—Packer's new list..... \$ 10.00

Knobs.—"Norwalk" New list..... \$ 10.00

Silver Glass..... \$ 10.00

Silver Glass Bell Pulls..... \$ 10.00

Lanterns.—Guarded, No. 99..... \$ 10.00

Tabulars, No. 9..... \$ 10.00

Railroad, Oil, No. 43..... \$ 10.00

Triangular..... \$ 10.00

Hurricane..... \$ 10.00

Lawn Mowers.—The "Daisy"..... \$ 10.00

12 in. cut..... \$ 10.00

14 in. cut..... \$ 10.00

16 in. cut..... \$ 10.00

Lead.—Sheet..... \$ 10.00

Pipe..... \$ 10.00

Locks.—Norwalk..... \$ 10.00

Eagle Cabinet..... \$ 10.00

Eagle Trunk..... \$ 10.00

W. Wilcox & Co., Padlocks..... \$ 10.00

Manure Forks.—W. C. & Co..... \$ 10.00

Matticks..... \$ 10.00

K. P. & Co. Long Cutter, \$4.00..... \$ 10.00

K. P. & Co. Short Cutter, \$15.50..... \$ 10.00

K. P. & Co. Pick Cutter, \$15.00..... \$ 10.00

Measuring Tapes.—Eddy's..... \$ 10.00

Meat Cutters.—Miles' Challenge..... \$ 10.00

Meat's (new list)..... \$ 10.00

American..... \$ 10.00

Money Drawers.—Tucker's Am..... \$ 10.00

Mouse Traps.—Delusion..... \$ 10.00

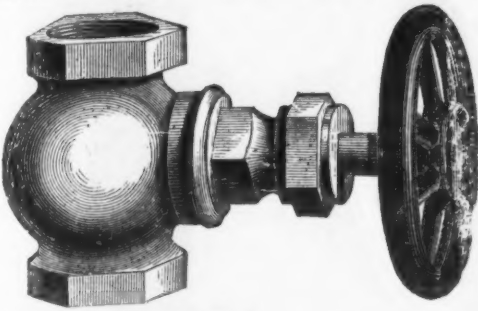
Novelty..... \$ 10.00

Nails..... \$ 10.00

Oil..... \$ 10.00

Oil..... \$ 10.00


McNab & Harlin Mfg. Co.,
MANUFACTURERS OF
BRASS COCKS AND VALVES,
For STEAM,
WATER
and GAS.
**WROUGHT IRON
PIPE AND FITTINGS.**
PLUMBERS' MATERIALS
Factory, Paterson, N. J. 56 John Street, N. Y.



BLACK AND TINNED IRON RIVETS.




W. P. TOWNSEND & CO.,
PITTSBURGH, PA.,
Manufacturers of every description of First Quality
RIVETS.
HENRY B. NEWHALL,
105 Chambers St.,
New York Agent.




Wm. H. HASKELL, Pres. E. S. MASON, Treas.
WM. H. HASKELL CO.,
Pawtucket, R. I.

COACH SCREWS,
(With Gimlet Points),
ALL KINDS OF
Machine and Plow Bolts,
AND
TAP BOLTS.
HENRY B. NEWHALL,
105 Chambers St.,
New York Agent.



STANDARD NUT CO.,
Pittsburgh, Pa.,
MANUFACTURERS OF
**HOT PRESSED
Square & Hexagon Nuts,**
**R. R. FISH BARS,
BOLTS,
SPIKES.
RIVETS, &c.**
HENRY B. NEWHALL,
105 Chambers St.,
New York Agent.



Philadelphia "STAR" Bolt Works.
NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. **Star Axle Clips, &c.**
TOWNSEND, WILSON & HUBBARD, 2301 Cherry Street, Philadelphia, Pa.



BAGNALL & LOUD,
BOSTON, MASS.,
Sole Manufacturers in U. S. A. of our
Celebrated
**METALINE
AND
Improved Sleeve Roller
Bush Tackle Blocks.**
Try Us with a Sample Order.
Send for Illustrated Catalogue.
New York Warehouse, 33 South St.



EATON, COLE & BURNHAM CO.,
58 John St.,
NEW YORK.
Factory at
BRIDGEPORT, CT.
MANUFACTURERS OF
Fittings, Valves, Tools,
AND ALL STYLES OF
Goods for Steam, Water, and
Gas, Wrought Iron Pipe, &c.
Agents for **BUNDY'S RADIATORS.**
Manufacturers of
DEANE'S PATENT SOLID STOCKS AND DIES.



LIGHTNING HAY KNIVES.
WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes.
The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for exports as well as home trade, and it seems destined to take the place of all other Hay Knives.
They are nicely packed in boxes, one dozen each of 50 pounds weight, suitable for shipping by land or water to any part of the world.
MANUFACTURED ONLY BY
HIRAM HOLT & CO.,
East Wilton, Franklin Co., Maine.
For sale by the Hardware Trade generally.



NORWAY IRON CARRIAGE & TIRE BOLTS.
Axle Clips, &c.
Only Medal, Phila., 1876.
COLEMAN EAGLE BOLT WORKS,
WELSH & LEA, Philadelphia, Pa.



W. C. WREN'S PATENT GRATE BAR.



DAVID S. CRESWELL, Manufacturer,
416 Race Street,
The most durable Grate Bar on the market.
PHILADELPHIA, PA.
Send for circular and price list

American Tool Co.,
Manufacturers of
TOOL CHESTS OF ALL SIZES
Adapted for the use of Boys, Youths, Gentlemen, Farmers, Planners, Carpenters, Railroads and Mines fitted up complete with a superior quality of Tools, and suited to the wants of the Hardware, Toy, Notion and Variety trades. Export trade solicited, and a full stock of large-sized Chests always on hand. Quality considered, we think our goods will be admitted by buyers the cheapest that have yet been offered by any manufacturer in the United States or Europe. Illustrated descriptive catalogue furnished free on application with prices.
MECHANICS' TOOLS AND HARDWARE SPECIALTIES, &c.
Warehouse and Salesroom, 116 Chambers St., New York, U. S. A
Factories, 200, 214-218 W. Houston St., near Varick.



THE CINCINNATI BARBED WIRE FENCE CO.
JAN. LARSON, Pres't. OFFICE AND FACTORY,
52, 54, 56, 58 & 60 New Street.
CINCINNATI, OHIO. C. W. COLE, Sec'y.
Cables and Barbs warranted all steel.
LICENSED MANUFACTURERS OF
FOUR-POINTED BARBED WIRE FENCING.
DODMAN & BURKE, 88 Chambers Street, New York, direct Representatives.



NEW HAVEN NUT CO.
MANUFACTURERS OF
HOT-PRESSED NUTS AND WASHERS,
See Iron Age First Issue Each Month.
WESTVILLE, CONN.



P. BLAISDELL & CO.,
Manufacturers of
MACHINISTS' TOOLS
Blaisdell's Patent Upright Drills,
With Quick Return Motion.
Engine Lathes, Planers, Boring Mills,
Gear Cutters and Hand Lathes.
WORCESTER, MASS., U. S. A.



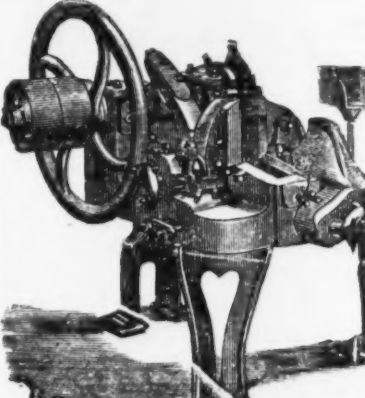
P. W. Gallaudet
Cor. Broadway and Wall St., New York.
Bakers and dealers in **COMMERCIAL PAPER.**
Stocks and Bonds dealt in for cash or on margin at New York Stock Exchange.
**MACHINERY FOR
Straightening and Cutting Wire**
Of all Sizes to any Length.
Send for Catalogue.
JOHN ADT,
New Haven, Conn., U. S. A.

WILLIAMS, WHITE & CO.,
MOLINE, ILLINOIS.
MANUFACTURERS OF
DROPHAMMERS,
HORIZONTAL PRESSES FOR BENDING IRON,
GANG BORING MACHINES, TOOLS FOR PLOW MAKERS,
THE JUSTICE HAMMER.
SEND FOR CIRCULARS.

HOLT
PORTABLE FORGES.
Revolution in Prices.
Forges, \$10. Former price, \$23.
For particulars address
HOLT MFG. CO.
Cleveland, Ohio.



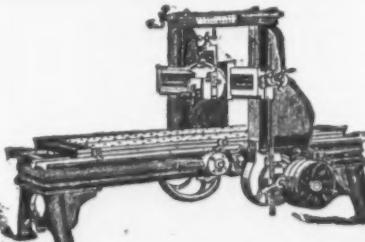
PITTSBURGH MFG. CO.,
Manufacturers of Nail and Spike Machines, Bolts
Nuts, Washers, Rivets, &c. Castings, Forging
and Blacksmith Work promptly attended to.
OFFICE & WORKS, Railroad St. near 28th, Pittsburgh, Pa.



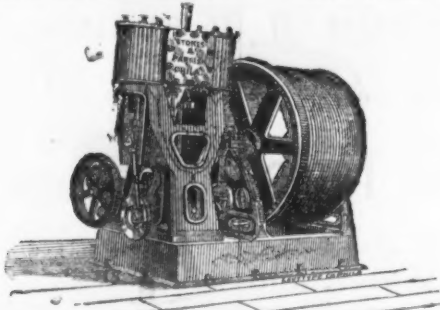
THE LA FRANCE FIRE ENGINE CO
Manufacturers of
Rotary Steam Fire Engines
ELMIRA, N. Y.



JOHN H. WRIGHT
Manufacturer of
MACHINISTS' TOOLS
FROM THE LATE
WOOD, LIGHT & CO.'S PATTERNS
Of Lathes and Planers.
Mr. Wright having formerly been an contractor
in building the same, will give superior work to all
who favor him with their orders.
GEAR CUTTING A SPECIALTY.
Lock Box 1856, Bridgeport, Conn.



VERTICAL ENGINE



IRON FURNACE HOIST.

The above cut represents our Vertical Iron Furnace Hoisting Engine, having double cylinders fitted with our improved reversing valves, automatic stop and brake. Prices furnished on application for engine alone or for complete outfit. Patterns on hand for various sizes.

STOKES & PARRISH, 3001 Chestnut St., Philadelphia.

\$\$\$ **SAVED** \$\$\$

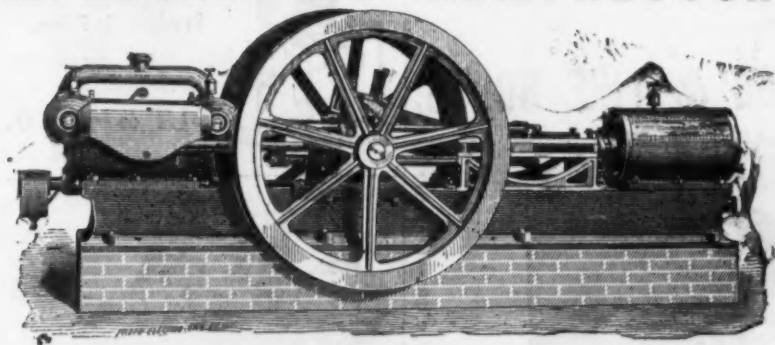
1977 NINETEEN HUNDRED SEVENTY-SEVEN 1977
MACHINES
BOTH NEW AND SECOND-HAND

COMPRISING
MACHINE AND BLACKSMITH
TOOLS OF EVERY DESCRIPTION.
WOOD-WORKING MACHINERY IN ALL ITS
BRANCHES. PORTABLE ENGINES. UPRIGHT and HOR-
IZONTAL STATIONARY ENGINES. 1 TO
300 HORSE POWER. S.C.F. & CO. LOCOMOTIVE FIRE-
BOX, HORIZONTAL, and UPRIGHT BOIL-
ERS, 1 TO 100 HORSE POWER. WATER WHEELS, COT-
TON AND WOOLLEN MACHINERY, STEAM
PUMPS, CRISTMILL MACHINERY,
Etc., FULLY DESCRIBED, AND
PRICES ANNEXED.

Send stamp for same. In our List No. 23. [stating what you want.]
We have the Largest Assortment of Machinery to be
found in the hands of any firm in the country.

Works and Main Office, Manchester, N. H. **S. C. FORSAITH & CO.**
Branch Office and Wareroom, 209 Center street, New York City.

IMPROVED AIR COMPRESSOR!



MANUFACTURED BY THE
MORRIS COUNTY MACHINE & IRON Co.
DOVER, N. J.

Has positive moving Rotary Valves. Will give better results than any compressor built at the present time, which can be authenticated by parties now using them. They are also used to drive pumps in deep mines. With forty pounds of steam will give fifty pounds air pressure. Send for descriptive circular.



TRADE MARK.

**A THE ELKINS MFG. & GAS CO.'S
J AJAX METALS,
X FOR**
LOCOMOTIVE, CAR, ROLL NECK AND
MACHINE BEARINGS,
PUMP RODS, VALVES AND PLUNGERS,
&c.

Furnished in Ingots or Castings.

Sheet Metals a Specialty.

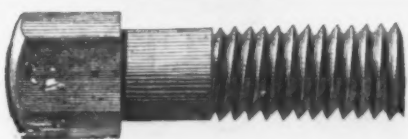
THE ELKINS MFG. AND GAS CO.,
617 and 619 Arch St., Philadelphia.

OF MANUFACTURERS
Ajax Metals, Maxim's Improved Gas
Machines,
BARTON'S PATENT STOP VALVE.
Builders of Gas Works.



HOISTING ENGINES.

We are now prepared to deliver 6x12 and 7x12 single cylindered Horizontal Engines, and double cylindered at short notice, with the *Friction Clutch* attached, with or without boilers. This clutch has proved to be the best in the world for this work. It can be so adjusted that it will do a small amount of work, and from that up to the full power of engine, with no risk of breaking ropes, gearing or engine, a feature which no other friction contains. Address,
D. FRISBIE & CO., 123 N. Fourth St., Phila., Pa.



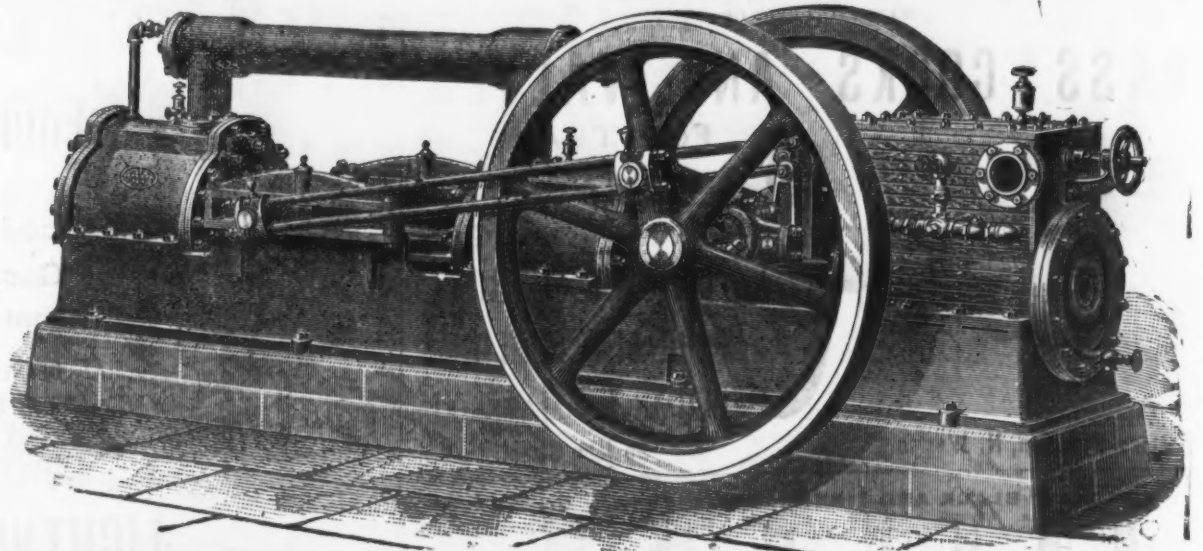
JOHN FELLOWS,
Manufacturer of
SCREWS, NUTS & BOLTS,
Piano Hardware, Agraffes and Novelties in Metal.
Wholesale and Retail Dealer in
IRON, STEEL & BRASS
MACHINISTS' SUPPLIES. No. 70 Broadway, Brooklyn, E. D.

THURNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 20 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.

Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.

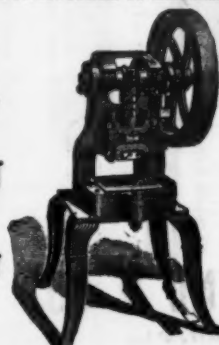
E. W. Bliss, BLISS & WILLIAMS,
MANUFACTURERS OF ALL KINDS OF
PRESSES and DIES.



Also Manufacturers of
SPECIAL MACHINERY

FOR
WORKING SHEET
METALS, &c.
FRUIT & other
CAN TOOLS.

GOLD MEDAL AWARDED



Plymouth, Pearl and
John Streets,
BROOKLYN, N. Y.,
U. S. A.



PARIS EXPOSITION, 1878.

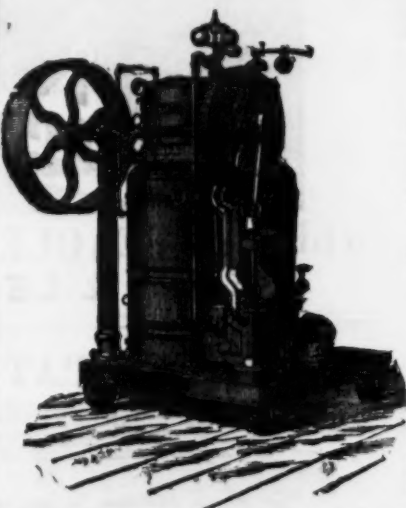
GLOBE MFG. CO., Middletown, Conn.,

Manufacturers of



THE FAVORITE POCKET WRENCHES

Made both of best Malleable Iron and Cast Steel tempered in Oil. Two sizes, 1 and 1 1/2 inch. Also manufac-
turers of the "Baldwin" Plane Irons and a full line of Socket Wrenches and Framing Chisels, Socket Gouges,
Cleavers, Draw Knives, &c. Catalogue and discounts to the trade.

**SHAPLEY ENGINE.**

Patented Feb. 10, 1874; Reissued June
22, 1875.

Compact, Practical, Durable and
Economical.

Acknowledged to be the best in use. This boiler
stands unrivaled.

MANUFACTURED BY

SHAPLEY & WELLS,

Binghamton Iron Works,
Binghamton, N. Y.

Manufacturers of

Stationary Engines and Boilers.

Also Machinery for Mills of all kinds and
Tanneries. Also their celebrated Bark
Mills, acknowledged to be the best.
Send for reduced price list circular.

**Ludlow Valve Mfg. Co.,**

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vall Ave., Troy, N. Y.

VALVES.

Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.,
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.



WICKERSHAM & CO.,
MANUFACTURERS OF
**RAILWAY, MINERS', MILL & MACHINISTS'
SUPPLIES.**

W. & C's Packing: Steam, Hydraulic and Locomotive. Sam-
ples sent free.
Lubricants for Engines, Shafting, &c.; Rolling Mill, Railroad,
Gear and Axle Grease.
Also, Star Cylinder Oils.
Samples sent free for trial upon application
No. 309 Race Street, Philadelphia, Pa.

Price \$12.00.

Liberal discount to the trade.

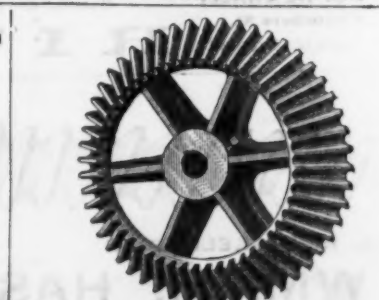
Send for Circular.

Manufactured by

CLARK SINTZ,

Springfield Ohio.

The Swiss Patent Automatic Cut-off Engine
Is first class in
every respect.
The valve gear
is of the disen-
gaging type, is
exceedingly
simple, accessi-
ble and durable.
Cylinders with
this cut-off can
be placed on any
engine now in use at moderate expense, and will
save from 30 to 50 per cent. in fuel over the plain
slide valve and throttle governor. Also, Vertical,
and Yacht Engines. **NELSON W. TWISS,**
25 Whitney Ave., New Haven, Conn.



Machine Moulded Mill

GEARING,

SHAFTING, PULLEYS, &c.,
in great variety of sizes. Castings or Finished
Work furnished the Trade at favorable rates.

POOLE & HUNT,
BALTIMORE, MD.

**DEAD-STROKE POWER HAMMERS.**

DIENELT & EISENHARDT,
MAKERS,
1310 Howard St., Philadelphia.

Standard Weight Lap Welded
WROUGHT IRON PIPE, &c.,
STEAM PUMPS, &c.,

STEAM AND HYDRAULIC
Freight & Passenger Elevators, &c.
STEAM HOISTING ENGINES, &c.

MANUFACTURED BY
CRANE BROS. MFG. CO.,
CHICAGO.

Send for Catalogue.

Machinery, &c.

LYON'S HAND OR POWER PUNCHES AND SHEARS.

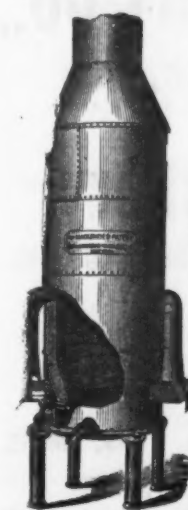
For Round, Flat or Square Iron,

Polishing & Buffing Machinery,
HYDRAULIC JACKS,
To raise from 2 to 120 tons.
HYDRAULIC PRESSES,
For special and general use.
HYDRAULIC HAND & POWER PUMPS
with 1 to 6 plungers, to run hydraulic presses, with
either uniform or changeable speed.
Second-hand Presses.
E. LYON & CO.,
470 B Grand Street, NEW YORK.
Send for circular of what you want.

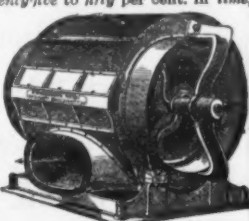


**THE MACKENZIE PATENT
CUPOLA & BLOWER.**

Send for circular to
Smith & Sayre Mfg. Co.,
PROPRIETORS, 245 Broadway, New York.



This Cupola has made a great revolution in melting iron. It differs from all others in having a continuous tuyere, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made oval in form. This brings the blast to the center of the furnace with the least resistance and smallest possible amount of power, and in combination with the continuous tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting ten or fifteen tons an hour with the pressure of blast required to melt two or three tons in an ordinary cupola. It also enables us to save very largely in time and fuel, the experience of our customers showing a gain of twenty-five to fifty per cent. in time, and twenty-five to forty per cent. fuel over the ordinary cupola, and a better quality of casting, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting. We manufacture these Cupolas of any desired capacity, numbered from 1 to 25, inclusive, the numbers indicating the melting capacities in tons per hour—No. 1, one ton; No. 2, two tons; No. 3, three tons per hour, and so on up to 25, or 30 tons. We have improved the construction of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own and the experience of our customers could suggest.



NEW OTTO SILENT GAS ENGINE.

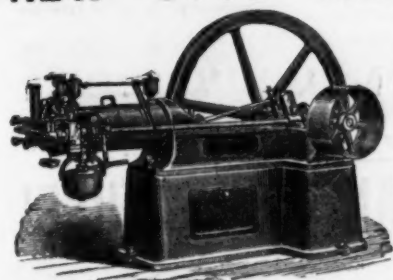
Working Without Boiler, Steam,
Coal, Ashes or Attendance.

Started Instantly by a Match, it gives Full
Power Immediately.

When Stopped, all Expense Ceases.

No explosions, no fires nor cinders, no gauges, no pumps, no engineer or other attendant while running. Recommended by insurance companies. UNSURPASSED IN EVERY RESPECT for hoisting in warehouses, printing, ventilating, running small shops, &c.

2, 4 and 7 H. P. and upwards. Built by
SCHLEICHER, SCHUMM & CO.,
Engineers and Machinists,
N. E. Cor. 33d & Walnut Sts., Philadelphia.



STEPHEN A. MORSE.

C. M. WILLIAMS.

EDWIN F. MORSE.

SEND
FOR
CIRCULARS.

CLEM & MORSE,
Manufacturers and Builders of

LATEST
PATENTED
IMPROVEMENTS.

ELEVATORS,

Hoisting Machinery, Automatic Hatch Doors, &c.

413 Cherry St., PHILADELPHIA, PA. Branch Office, 108 Liberty St., NEW YORK.

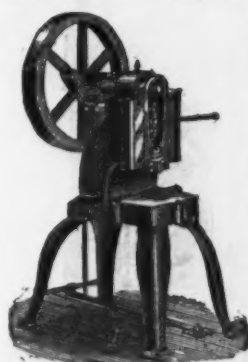
PUNCHING & SHEARING PRESSES.

Power, Foot or
Hand
PUNCHES,
AND
SHEARS.

All sizes, from \$25 to \$3000.

Peerless Punch &
Shear Co.,

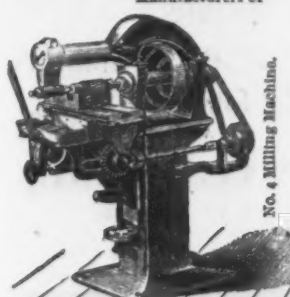
38 W. Day Street,
NEW YORK CITY.



A. H. MERRIMAN,
Merriman, Conn.,
Manufacturer of all Descriptions of
PRESSES.
Catalogue and prices sent on application.

E. E. CARVIN & CO.,

Manufacturers of



130-145 CENTRE STREET,
Cornell's Building,
NEW YORK.
Send for Illustrated Catalogue.

NOT-TAPPERS
RAPID BOLT CUTTERS
LATEST IMPROVEMENTS
SEND FOR CATALOGUE
53 CENTERS
CLEVELAND, O.

STEEL HOIST, UNDER

Thompson's Patent.

NO WORM GEAR,
NO FRICTION BRAKES.

Made of Annealed Cast Steel
and Malleable Iron.
DOUBLE SPEED.

1000 to 40,000 Lb. Capacity. Sole
Manufacturers in America.

STEEL HOIST MFG. CO.
170 to 174 Grand St.,
Pittsburgh, Pa.

Send for Catalogue.
English Patent For Sale.



Box's Patent Portable Double

Screw Hoists, &c., &c.

FIRST PREMIUMS WHEREVER EXHIBITED.

Philadelphia, Pa., 1879. St. Louis, Mo., 1879.
Cincinnati, O., 1880. Philadelphia, Pa., 1880.

Box's New Patent Portable Right

and Left Screw Hoist.

The latest invented Hoist, with all Box's
Patented improvements added. Guaranteed
in every particular Positive in action,
and double the power of
other Hoists. No
thrusts; no friction.
Single strong lift chain,
and perfect guides for
both hand and lift
chains. It cannot be
beat. Sizes from 1000 to
12,000 pounds capacity.
BOX'S PATENT PORT-
ABLE DOUBLE SCREW
HOIST. Always reliable.
Simple, Durable, Light.
Size 500 and 1000 pounds
capacity.

BOX'S PATENT POWER OR HAND ELEVATORS
Sizes 1000 to 20,000 pounds capacity.

BOX'S PATENT RADIAL DRILLS, &c. Full descriptive
circulars furnished.

Northern Liberties Works,
ALFRED BOX & CO.,
319 & 314 Green Street, Philadelphia, Pa.



THE CRESCENT STEEL TUBE SCRAPER

FINEST TOOL MADE
SEND FOR ILLUSTRATED PRICE LIST.
CRESCENT MFG. CO. CLEVELAND, U.S.A.

CHARLES W. ERVIE & CO.,

Engine Builders, Boiler

Makers and

GENERAL MACHINISTS,
IRELAND STREET, PHILADELPHIA.

Machinery, &c.

WILLIAM SELLERS & CO.,
PHILADELPHIA.

Manufacturers of

Iron & Steel Work-

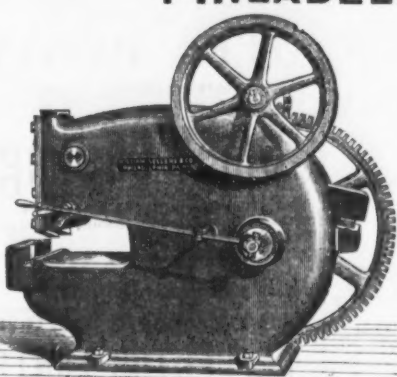
ing Machinery,

MACHINISTS' TOOLS,

SHAFTING,

GEARING, &c.,

INJECTORS.



Shearing Machine.

BRANCH OFFICE, 79 Liberty Street, New York.

THE

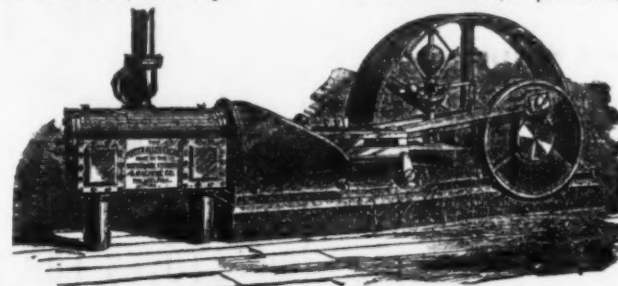
PORTER-ALLEN HIGH-SPEED STEAM ENGINE

W. H. MERRICK, Pres. and Treas.

G. A. BOSTWICK, Secretary.

C. T. PORTER, Vice-President.

C. B. RICHARDS, Superintendent.



Belts and gearing dispensed with for any speed up to 600 revolutions per minute. Especially
adapted to Rolling Mill work, Factories and Electric Light Machines.

Having extensive foundry facilities, the company are prepared to contract for

IRON AND BRASS CASTINGS.

With largely increased facilities we are prepared to fill all orders for the Porter-Allen High-Speed
Engine on contract time. Prices and terms will be furnished on application.

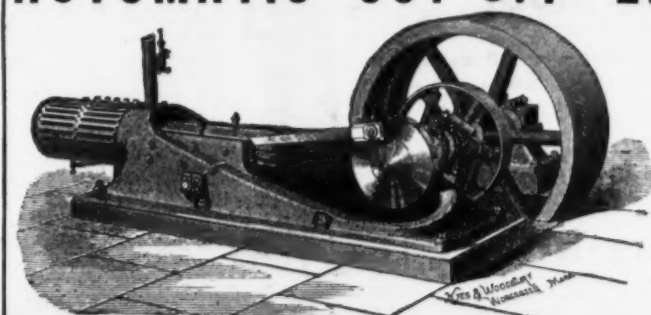
Business communications, to receive prompt attention, must be addressed to the company.

SOLE MAKERS,

THE SOUTHWARK FOUNDRY AND MACHINE CO.,

430 Washington Avenue, Philadelphia.

**THE HARTFORD
AUTOMATIC CUT-OFF ENGINE.**



Built for Heavy
and Continuous
Work, and adapted
to Any Re-
quired Speed,
with Close Reg-
ulation and best
attainable Econ-
omy of Fuel.
Circular and Prac-
tical Treatise on
Steam Engineering
sent on application.

The HARTFORD ENGINEERING COMPANY,

HARTFORD, CONN.

NEW YORK OFFICE - - ROOMS 72 and 73, ASTOR HOUSE.

EATON & PRINCE,

Manufacturers and Dealers in

ELEVATORS,

SHAFTING, PULLEYS,

Hangers, General and Special Machinery,

74 and 76 Michigan St.,

CHICAGO.

Send for prices and mention this paper

HARRISON BOILER. "THE SAFEST"



HARRISON BOILER.

"THE SAFEST"

157 & 159 W. 4th St.

PHILA.

Adapted for All Steam Purposes.

Merits have been proved during ten to fifteen years' constant use by such concerns as Cheney Bros., South Manchester, Conn.; Wallace and Sons, Ansonia, Conn.; Wampanoag Mills, Westmore Mills, Sagamore Mills, Fall River, Mass.; Sears' Building, Boston, Mass.; Brown & Sharpe Mfg. Co., Providence, R. I.; A. T. Stewart & Co., Tiffany & Co., New York; Stevens' Institute, Hoboken, N. J.; Mathieson & Wiecher's Sugar Refinery, Jersey City, N. J.; Wm. Sellers & Co., S. B. White, Daniel Allen, Jacob Gardner & Co., Phosphor-Bronze Smelting Co., Henry Tower, Evening Bulletin, Saturday Night, Philadelphia, Pa., and numerous others. Franklin Institute Medal awarded for Superiority of Economy, Efficiency, Economical Capacity for Generating Steam and Dynamic Value of Steam. Easily transported on mule back. Send for Descriptive Catalogue.

HARRISON BOILER WORKS

15th and WOOD STS., PHILADELPHIA, PA.

DEAN BROS'

STEAM PUMP WORKS,

INDIANAPOLIS, IND.

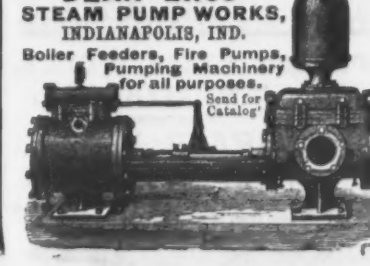
Boiler Feeders, Fire Pumps,

Pumping Machinery

for all purposes.

Send for Catalogue

169 Christopher St., near West St., N. Y.



KATZENSTEIN'S

Self-Acting Metal

Packing,

For Piston Rods, Valve

Stems, &c.,

Of every description

For Steam Engines,

Locomotives, Pumps,

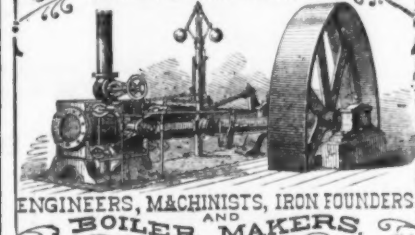


Adopted and in use by the principal Iron Works and Steamship Companies within the last eight years in this and Foreign countries. For full particulars and references direct to

L. KATZENSTEIN & CO.,
169 Christopher St., near West St., N. Y.

Machinery, &c.

CORLISS ENGINE BUILDERS
WITH
WETHERILL'S IMPROVEMENTS



ENGINEERS, MACHINISTS, IRON FOUNDERS
AND
BOILER MAKERS.

ROBT. WETHERILL & CO. Chester, Pa.

STOW FLEXIBLE SHAFT CO., Limited,

15th & Pennsylvania Ave.

PHILADELPHIA, PA.,

Manufacturers of

Portable Drilling,

Tapping, Reaming

and Boring

Machines.

Also, Tools

for Emery

Wheel Grind-

ing, Metal &

Wood Polish-

ing, Cattle

Brushing &

Clipping, &c.



PHILA. SHAFTING WORKS,

18th & Hamilton St.,

PHILADELPHIA.

SHAFTING

(SPECIALTY.)

Manufacturers of

Shafting, Pulleys,

Hangers, Couplings

and every ap-
pliance used in the

TRANSMISSION OF

STEAM POWER.

**PATENT HUB FRICTION
CLUTCH PULLEY
AND
CUT-OFF COUPLING.**



Manufactured by

JAS. SMITH & CO., 137 Market St., Phila., Pa.

We claim for this device the following advantages:

It works easily, without noise, but effectively.

It is very durable, extremely simple and cheap.

It can be applied to pulleys with hub one inch in diameter.

Up to sizes capable of transmitting 100 horse power or more.

It can be placed on shafting in place of couplings for detaching lines.

It has been adopted by several of the leading man-
ufacturers of machinery. Unlike other clutches, the
friction in this is applied to the hub, upon which
we hold exclusive control under patents No. 157,873,
dated Nov. 24th, 1871; Release No. 808, dated Dec.
10th, 1878. Clutches which are being placed on the
market with any device or mechanism clamping a
hub are in infringement on this patent No. 808, and will
in due time be prosecuted to the full extent of the law.

Established 1867.

Edwin Harrington & Son

MANUFACTURERS OF

PATENT EXTENSION AND

SCREW CUTTING

LATHES,

Iron Planers,

Radial, Upright, Suspension

Multiple and Lever

DRILLS,

and a variety of other

MACHINISTS' TOOLS,

Patent

Double Chain Screw

Pulley Blocks,

Unrivalled for Durability, Safe-
ty and Power.

Patent Double Chain

Quick-Lift Hoists,

with Brake for quick and easy
lowering.

Circulars furnished.

WORKS AND OFFICE.

Cor. N. 13th and Penna. Ave.,

Philadelphia, Pa., U. S. A.

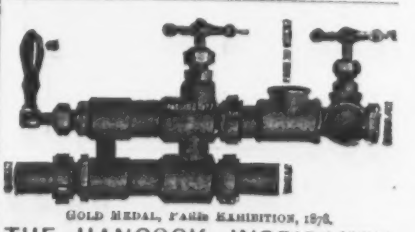
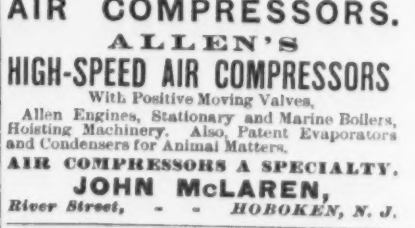
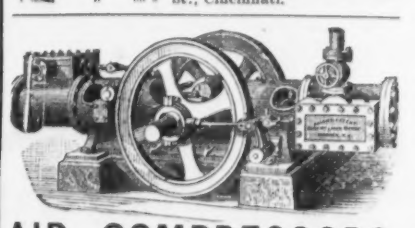
Represented by J. Q. MAY,

140 W. Liberty Street, N. Y.,

C. E. KIMBALL, 101 High

Boston, W. H. RICEY, 10 Main

St., Cincinnati.



AIR COMPRESSORS.

ALLEN'S

HIGH-SPEED AIR COMPRESSORS

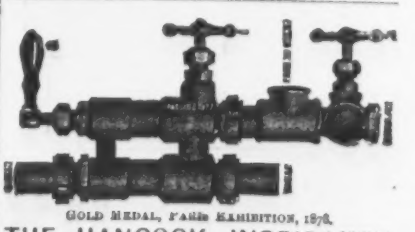
With Positive Moving Valves.

Allen Engines, Stationary and Marine Boilers,
Hoisting Machinery, Also, Patent Evaporators
and Condensers for Animal Matters.

AIR COMPRESSORS A SPECIALTY.

JOHN McLAREN,

River Street, - - HOBOKEN, N. J.



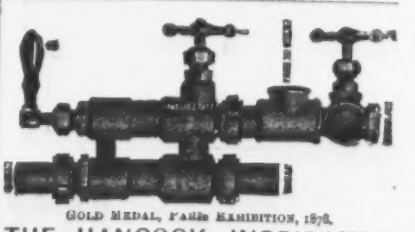
GOLD MEDAL, FAIR EXHIBITION, 1876.

THE HANCOCK INSPIRATOR.

New Combined Pump and Injector.

Eclipses all other appliances hitherto introduced for
feeding Steam Boilers. A Portable Boiler is not per-
fect without one. It lifts its water 21 feet with a low
steam pressure, and puts it directly into the Boiler
No adjustment necessary for varying steam pressures.

G. W. STORKE, General Agent, 149 N. 3d St., Phila.



TUBAL SMELTING WORKS.

160 South Broad Street, PHILADELPHIA.

PAUL S. REEVES,

MANUFACTURER OF

ANTI-FRICTION METALS.CAR & MACHINERY BRASSES, INQOT BRASS
AND SOLDER, WHITE BRASS.

Old Metals and Brass Turnings Wanted.

ESTABLISHED 1842.

WM. & HARVEY ROWLAND,
PHILADELPHIA,

P. O. Address: Frankford, Philad'a. } MANUFACTURERS OF ALL KINDS OF

Elliptic, Platform & C Springs,**"Brewster Side Bar Combination
Patented" Springs.**

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

**CAST SPRING AND PLOW STEEL.
CAST SHOVEL, HOE AND MACHINERY STEEL.**

OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.

BESSEMER SHOVEL AND PLOW STEEL.

BESSEMER MACHINERY AND CULTIVATOR STEEL.

RE-ROLLED NORWAY SHAPES.

NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS.

**STEEL
CASTINGS**FROM 1-4 TO 15,000 LBS. WEIGHT.
True to pattern, sound and solid, of unequalled strength, toughness and
durability. An invaluable substitute for forgings, or for cast iron
requiring three-fold strength. Gearing of all kinds, Shafts, Dies, Ham-
merheads, Crossheads for Locomotives, etc. 20,000 Crank Shafts and
15,000 Gear wheels of this Steel now running prove its superiority
over other Steel Castings. CRANK SHAFTS, CROSSHEADS AND
GEARING ARE SPECIALTIES. Circulars and Price Lists free.
Address:**CHESTER STEEL CASTINGS CO.,**
Works, Chester, Pa. 407 Library st., Philadelphia.**IMPROVED STEEL CASTINGS.**

Under Hainsworth's Patents.

We make Castings practically free from blow-holes, of steel which is as soft and as
easily WORKED and WELDED as Wrought Iron, yet is STIFF, STRONG and DURABLE, with a
TENSILE STRENGTH of not less than 65,000 lbs. to the square inch. In short, our CAST
INGS UNITE THE QUALITIES OF STEEL AND WROUGHT IRON.Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all
descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landsides.
WE USE NO CAST IRON.

Send for circular.

PITTSBURGH STEEL CASTING CO.,
PITTSBURGH, PA.**Punching Presses,**

DIES AND OTHER TOOLS

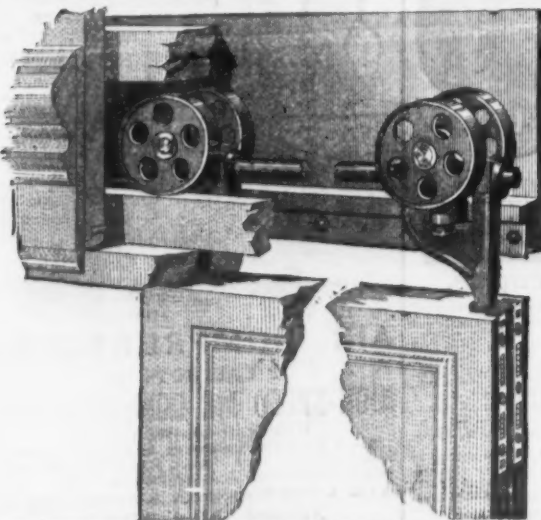
For the manufacture of all kinds of

SHEET METAL GOODS,

DROP FORGINGS, &c.

Stiles & Parker Press Co.,

Middletown, Conn.

**NO FLANGED WHEELS.**

Warner's Patent

SLIDING

DOOR HANGER,

MANUFACTURED BY

E. C. STEARNS & CO.,

SYRACUSE, N. Y.

SALES OF

CHAS. HUMES & CO.,

ST. LOUIS, MO.

1877, - - - 20 SETS.

1881, - - - 500 SETS.

Send for Illustrated Catalogue.

**Newby's Stove Repairs.**Can be adjusted to fit any Cook Stove. Every
Dealer should carry them in stock.

For Illustrated price list address

INDIANA FOUNDRY CO.,

INDIANAPOLIS, IND.

Merrill Brothers,
26 First Street,
BROOKLYN, N. Y.**DROP
HAMMERS,****HAMMERS,
FORGINGS and
POWER PRESSES****CINCINNATI ROLLING MILLS AND CHAIN WORKS**Manufacture Trace, Coll. Ox. Log and Wagon Chain, Fifth Wheels, Shackles and King Bolts, using only
Iron made at our mills from strictly selected Wrought Scrap.

OFFICE, 20 West Third Street. MILLS & WORKS, East & C. H. & D. H. R.

STANLEY G. FLAGG & CO.

PHILADELPHIA, PA.

Office and Works,

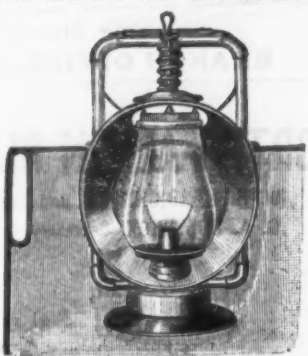
N. W. cor. 19th St. & Pennsylvania Ave.

Manufacturers of

STEEL CASTINGS.A Substitute for Steel & Wrought Forgings
Circulars sent on application.**Steel Castings.**Light and heavy Steel Castings of superior
metal, solid and homogeneous. All work guaran-
teed. Send for circular.**EUREKA CAST STEEL CO.,**

Chester, Pa.

Office: 307 Walnut St., Phila.

DIETZ No. 0 TUBULAR**REFLECTOR LANTERN**

Can be used on the dash.

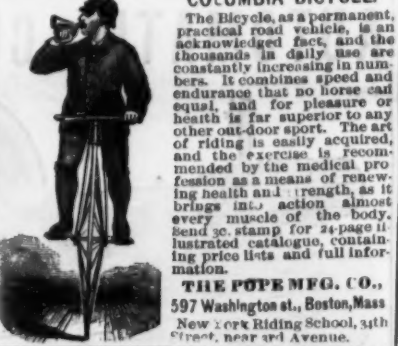
Throws a Powerful Light more than 100 feet.

Dietz Tubular Hot-Blast

OIL STOVES FOR 1882.**R. E. DIETZ,**54 & 56 Fulton St., NEW YORK.
25 Lake St., CHICAGO.**TACKLE BLOCKS.**Rope and Iron Strap of all kinds. Lig-
num vitae Wood for Ten-Pin Balls.**Wm. H. McMillan & Bro.,**

Office, 113 South Street, New York

Factory, 39 to 40 Penn St., Brooklyn, E. D.

**COLUMBIA BICYCLE.**The Bicycle, as a permanent,
practical road vehicle, is an
acknowledged fact, and the
thousands in daily use are
constantly increasing in num-
bers. It combines speed and
endurance that no horse can
equal, and for pleasure or
health is far superior to any
other out-door sport. The art
of riding is easily acquired,
and the exercise is recom-
mended by the medical pro-
fession as a means of renew-
ing health and strength, as it
brings into action almost
every muscle of the body.
Send for stamp for 24-page il-
lustrated catalogue, contain-
ing price lists and full infor-
mation.**THE PUMP CO.,**597 Washington St., Boston, Mass.
New York Riding School, 34th
Street, near 3rd Avenue.**BUFFALO BLACKSMITH'S BLOWERS**

& PORTABLE FORGES

FOR SALE BY ALL DEALERS

BUFFALO FORGE CO. MFRS

BUFFALO, N. Y.

SEND FOR CIRCULAR & PRICE LIST

**SEEGER
Jack
CREWS**Beat Everything in Cheapness
and Strength.

8 x 2 in. Jack, under Test, Sustained

25 TONS.

SEEGER MFG. CO.,

Box 1513, SPRINGFIELD, MASS.

BUTLER & GOLDEY MFG. CO.,

Limited.,

AGENTS, 97 Chambers St., New York.

BUFFALO SCALE CO.,
BUFFALO, N. Y.

Manufacturers of

R. R. Track Scales, Hay Scales, Coal**Scales, Grain Scales, Platform****Scales, Counter Scales, &c.**

Send for price list, stating what you want

ROLLER BUSHINGS!

STEEL AND COMPOSITION.

ROLLER BUSHED SHEAVES,

IRON AND COMPOSITION.

LIVESEY MANFG CO.,

Factory, NEW LONDON, CONN.

FRANK BALDWIN, Agent, No. 33 South St., New York.

AIR COMPRESSORS.

PRICES REDUCED. SEND FOR NEW CATALOGUE.

CLAYTON STEAM PUMP WORKS.

14 AND 16 WATER STREET, BROOKLYN, N. Y.

Scranton Brass Works,**J. M. EVERHART,**

Manufacturer of

BRASS WORK,

For Water, Gas & Steam. Also

Carr & Wilcox's Patent Cut Files.

Will cut faster, wear longer, and clog
less than any File in the market.

ONE Street, SCRANTON, PA.

RUSSELL, BURDSALL & WARD,

PORTCHESTER, N. Y.,

MANUFACTURERS OF

CARRIAGE, TIRE, PLOW, STOVE & OTHER BOLTS.

Carriage Bolts made from Best Square Iron a Specialty.

JOHN RUSSELL CUTLERY CO.,

Green River Works,

MANUFACTURERS OF

Table and Pocket Cutlery,

BUTCHERS', HUNTERS', PAINTERS', DRUGGISTS' & HOUSEHOLD KNIVES

IN ALL STYLES AND VARIETIES.

OLDEST AND LARGEST AMERICAN MANUFACTURERS.

New York Office.

25 Chambers Street.

Factories,

Turners Falls, Mass.

F. W. WURSTER,**IRON FOUNDRY****AND AXLE WORKS,**130 to 149 First St.,
Brooklyn, N. Y.**AXLES**

SUPERIOR

WAGON, CART AND

TRUCK AXLES.

Our facilities enable us to quote as
trade lower prices than any other
manufactory. Send for price list.**J. M. CARPENTER****PAWTUCKET, R. I.**

MANUFACTURER OF TAPS AND DIES.

GENUINE AMERICAN ICE CHISEL.

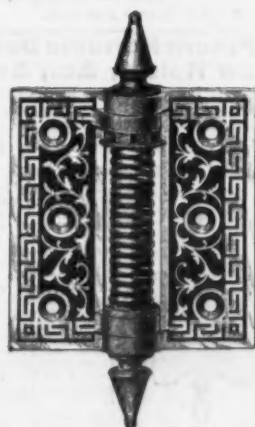
The Only ICE CHISEL that has Riveted Handle.

Manufactured of Solid Tempered Steel, Best Quality.

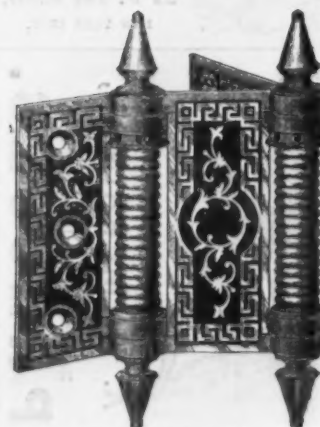
Patented October 26, 1877. Manufactured only by

E. M. BOYNTON.

80 Beekman Street, NEW YORK.

**SPRING HINGES AND DOOR SPRINGS.**

Climax Single Acting.



Climax Double Acting.

TORREY, BEE, & GRAY'S ROD DOOR SPRINGS.**GEM AND STAR COIL DOOR SPRINGS.****AMERICAN, GEM, ACME AND CLIMAX SPRING HINGES.**

MANUFACTURED BY

VAN WAGONER & WILLIAMS,

82 Beekman Street, - - - NEW YORK.

Send for Price List.

BALTIMORE RIVET AND SPIKE WORKS.Rivets,
Spikes,
Bolts,
Nuts,Washers
Bolt Ends,
Wood Screws,
Track Bolts.**WM. GILMOR of WM., cor. President & Fawn Sts.**